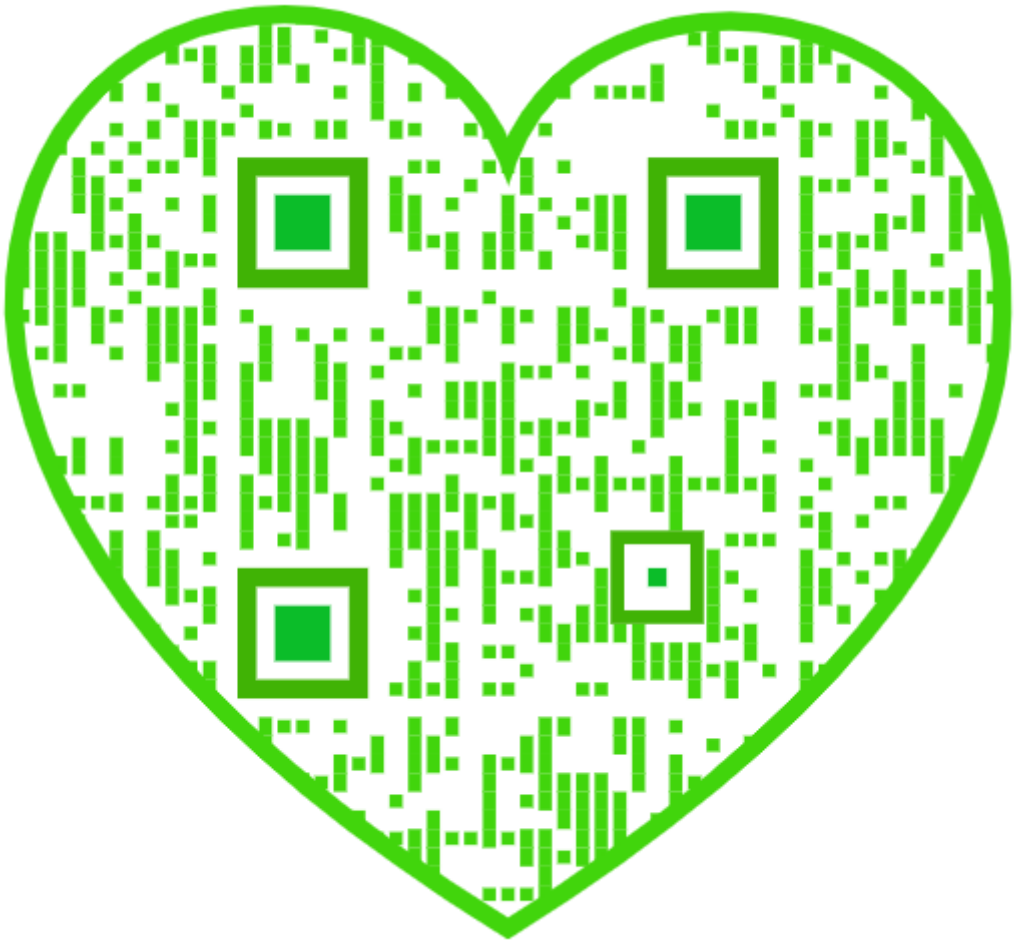

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Mrs. Malinda Goldson M.D.

San Francisco, Cal.

Family Medical Book

— ON —

MORALITY, THE DISEASES OF WOMEN AND CHILDREN, AND MISCELLANEOUS DISEASES

— BY —

Mrs. Malinda Goldson, M. D.

ILLUSTRATED

PACIFIC PRESS PUBLISHING COMPANY
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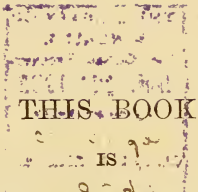

THIS BOOK

IS

DEDICATED, WITH AFFECTIONATE REGARDS,

TO

OUR AMERICAN WOMEN.

Dr. Goldson is a specialist on the diseases of women. The author took the post-graduate course in London, England, in 1890, on the Diseases of Women and Children; studied therapeutical electricity with the well-known French specialist in electricity, Dr. George Apostoli, of Paris, France; in 1892 opened the Lakeside Sanatorium in Oakland, California, conducted it successfully till 1897; in 1898 entered upon a special medical missionary work for the benefit of her sex.

The Author.

PREFACE.

In view of the innocent-thinking women of America, the author has written this book for the *sole* purpose of explaining to them why that which is thought to be innocent is a criminal wrong that can not be denied. The author has endeavored to make this book a safe guide for women.

We trust that our young women physicians will take a lively interest in this special line of medical missionary work; that this national evil may be overcome.

The author hopes that the introductory pages will be read with interest, because our American women will have need to raise men to defend our beloved country from any invasion that might be attempted by other foreign nations.

For the preparation of the index special thanks are due to Prof. George Underwood, whose painstaking accuracy is evident.

Malinda Goldson, M. D.

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FAMILY MEDICAL BOOK

CHAPTER I.

INTRODUCTORY.

DEDICATED TO OUR WOMEN.

We feel the importance of our women being made aware of the causes of so much ill health prevailing among them, also among our children in early life.

There are special growing evils and moral errors prevailing among our Anglo-Saxon people, which, apparently, would not be expedient for the ministers to treat from their pulpits. Neither can there be laws enacted by the means of which these growing evils can be checked. Hence the medical fraternity deem it to be the duty of the physicians to warn the people of the danger of these evils, bringing lasting disease upon themselves and a downfall to the nation.

Our medical text-books and journals are advising the physicians to clean their ranks of all unprofessional practises, and begin their medical reform in their offices, ere it is too late.

Realizing that it is the women and mothers with whom we have to deal, and through mothers we have to look for reformation for the welfare of our race, we therefore feel it the duty of women physicians to present this subject to the women.

We are urged to contribute to them our knowledge of practical experience, gleaned from women, as to the causes of so much ill health prevailing among them. We shall endeavor to instruct them from a medical standpoint and a common-sense view in a general way, using plain terms in plain English. We shall quote freely from various writers on the various subjects with which we have to deal, giving credit where credit is due. The pronoun "I" may be used when we feel that we need to do so.

My soul's desire is that good may come from this small addition to our large amount of medical literature. Being a mother myself, and feeling as I do for the welfare of our dear mothers, I truly believe that the gospel truth contained in this book will be the means of saving many lives, saving mothers from overwhelming sorrows, and bringing joy and sunshine to many a household.

Knowledge of the causes of evils and errors prevailing among our

children will be weapons in the hands of mothers "to put out the match before it becomes a conflagration." Our young women should be instructed from a medical standpoint the responsibility of married life, and also the natural result expected as to raising children, and the importance of letting nature take its course; and the fruit of the womb should not be molested; that it is God's plan for the reproduction of the human species, who are born into this world to fulfil His law and carry out His purpose, and finally honor Him throughout all eternity.

There is no doubt but that, in the first place, the medical fraternity are responsible, in a great measure, for the depopulating of our Anglo-Saxon race, which is, according to statistics, fast becoming extinct.

Women have been taught by their physicians some methods, considered harmless, by which to prevent conception in some cases, which, in their judgment, should not conceive, not realizing how prone women are to communicate to their sisters or friends how their physician instructed them to regulate their family, or probably not bear children at all, if a family of children is not wanted. The physician does not realize when or where such teaching and advice will end; neither did they think, when such advice was first given, that it would ever be the foundation for so much ill health among our women. Since I have turned my attention to instructing the women upon this topic, many of them are seemingly surprised at the dangers resulting from such practises. Most of them look upon the matter as a harmless and a domestic economy.

William Goodell, M. D., in referring to the prevention of conception, says, "A deplorable practise which, like the plague of frogs, creeps into our houses and bedchambers and beds." It comes from the dilettantism of our women, which shrinks from having its patrician pleasures and esthetic taste disturbed by the cares of maternity. It comes from fashion, from cowardice, from indolent wealth, and shiftless poverty. It comes from too high a standard of living, which creates many artificial wants, and demands many expensive luxuries. I am amazed at the very low standard of morality with regard to the sexual relation obtaining in the community. So low, indeed, has it fallen, that I have known clergymen either themselves practising preventive measures or else abetting their wives in them, and physicians of repute teaching their patients how to avoid having offspring. To these detestable practises do I attribute, in a great measure, much of the ill health of our married women. "Why is it," asks a layman, J. Parton, "that in the regions of the United States, otherwise most highly favored, nearly every woman under forty is sick or sickly?" Why is it, I ask, that the waiting-rooms of our gynecologists are crowded with so many querulous and complaining women,—women with groin-aches, backaches, headaches, and spine-aches; women either without sexual feeling, or else too weak to indulge in it?

Why do so many women break down either shortly after marriage, or very soon after the birth of the first child?—It is, I answer, because the majority of them, false to their moral and physical obligation, are trying either not to have children, or to limit their number. It is because, by an immutable law of nature, there appears to be no harmless way by which the "seed of another life" can be made unfruitful. It is because the wife, sinning the most and most sinned against, suffers most. Be the mode of prevention what it may, so much engorgement and hyperplasia and disorganization of the uterine structures and appendages are apt to take place in the women who keep themselves sterile. Their health breaks down, and they are apt to lose all sexual desire. What physician is there of ripe years who has not been opportuned by women hitherto wilfully barren, but now longing for children, to undo the mischief caused by such practises. There is another phase of this many-sided evil,—an ethical one,—which, in a strictly medical work, may seem out of place, but health and happiness are so correlated that what harms the one hurts the other. Statistics show that divorces are multiplying in this land in a far greater ratio than the gain in population. In the New England states the increase is so alarming as to arouse the attention of patriots and philanthropists. Every year the divorces granted in these states break up over two thousand families. But these figures do not tell the whole tale of disrupted households, for they do not include the many cases of voluntary separation between husband and wife, or of an application for divorce in which the parties were denied by the courts. For instance, a few years ago Congress appropriated ten thousand dollars to bear the expense of an inquiry into the working of marriage and divorce laws in the United States. The official report was made to Congress on February 20, 1889. It shows that 328,716 divorces were granted in the twenty years between and including 1867 and 1886. A single state, Illinois, granted 36,072 divorces in that time. Ohio followed closely, with 26,367, and Indiana with 25,193. The total in all the states for the year 1886 was 25,535. In the year 1868 the number of divorces granted was 9,837. The increase, therefore, in twenty years was about 157 per cent. But in the same years the population only increased about 65 per cent, which shows that the evil of divorce is increasing more than twice as fast as our population. From statistics lately published by the clerk of Cuyahoga County, in which Cleveland is situated, it appears that during the past year 1,080 cases of divorce were put on record in the court, viz., one divorce to seven marriages.*

Now why are there so many ill-mated marriages? Why these unhappy homes and broken households? What means these separations between man and wife? I answer, They mean the violation of one of nature's immutable laws. Sex is a profound fact which under-

* National Reform Document of 1890, 1894; *New York Observer*, October 26, 1895; the *Congregationalist*, July 27, 1893.

lies all the relations of life and the fabric of society, and it can not be ignored. The love interchanged between man and woman is no mere operation of mind, no sheer intellectual process. However pure this passion may be, it is necessarily an alloy, made up, like ourselves, of body and mind, the grosser mold so interfluxed with the more ethereal that the one finds its most passionate expression in the fruition of the other. The sexual instinct is given to man for two reasons,—to perpetuate the species, and to rivet the tie between husband and wife, not only by offspring, but by mutual endearment. The conjugal relation is, therefore, twofold in its nature. It has a moral as well as a physical expression, the two so interwoven that it is impossible to dissociate the one from the other without doing moral as well as physical harm.

The causes of domestic infelicity and ill-mated marriage are, then, to my mind, clear enough. The grossness of the carnal union is redeemed by its purpose,—the moral union, in which is involved the desire for offspring. Deprive the marriage tie of these qualities, strip it of the family idea, and it loses its cohesiveness in intense personality and self-asserting individualism. When a wife soils the marriage bed with the artifices and equipments of the brothel, and quenches all passion by cold-blooded safeguards, and when she consults her almanac, etc., can she otherwise not expect estrangement or jealousy to be the result of such action? "Can a home with such environment be a happy one?"

The ill health and childlessness of our women are sources of national weakness, at which every patriot may well take alarm. Searching statistical inquiries show that the birth-rate of our native population is steadily and alarmingly decreasing. By the ill health of our women, and by their unwifelike behavior or preventive measures, the American family is growing smaller and smaller, and the good old original Anglo-Saxon stock of our country, its brains, its bone, and its sinew, is rapidly dwindling towards extinction. For instance, from the records of six generations of families in some New England towns, the following facts were gleaned: It is found that the families composing the first generation had an average of between eight and ten children; the next generations averaged about seven to each family; the fifth generation, less than three for each family. The generation now coming on the stage is not doing so well as that. In Massachusetts the average family has numbered as low or less than three persons. Other states have not yet made such searching statistical inquiries, but there is no doubt that an alarming diminution in the Anglo-Saxon stock is taking place all over our country. In view of these facts, let us read two lessons from ancient history, and take warning from them.

Time was when every prolific Roman matron received a civic reward. Then she would exhibit her children, as Cornelia did her twelve, and proudly say, "These are my jewels." Five hundred and twelve years elapsed from the foundation of Rome before the first

formal divorce was granted, and the divorcer till his death was pursued by the obloquy of his fellow-citizen. In those days nothing could withstand the onset of the Roman legion. Rome ruled the known world, but Momsen tells us: "In the time of Julius Cæsar, celibacy and childlessness became more common; the family institution fell. The Latin stock in Italy underwent an alarming diminution." Divorces were now obtained on the flimsiest grounds. Criminal abortion was practised on the slightest pretext; nay, indeed, it was lauded as a praiseworthy domestic economy. Marcus Aurelius foresaw the danger, and tried to avert the evil, but, being a pagan and a doctrinaire, he failed. So prevalent had the crime become in Juvenal's day, that he leveled one of his most bitter satires against it. In it he says that it was most commonly resorted to by the Roman ladies, lest pregnancy should mar their beauty or spoil their figure. They termed the unborn child the shameful burden, and got rid of it, lest its growth should disfigure their belly with scars. But national sins beget national woes, and the Roman Empire, overrun by northern hordes, perished for the want of men.

Once the family institution was deemed the palladium of Hellas. The contemporary of Plato, of Socrates, and those heroes who fell at Thermopylæ, prided himself on the number of his sons who could fight for his country, and boasted of the number of his daughters who could hold the distaff.

Then Greece, for her superb heroism and magnificent pluck, won the admiration of the world. Her navies swept the Mediterranean, and her colonies studded the coasts. But (alas these "buts"!) one century and a half before the Christian era the serried ranks of the Macedonian phalanx quailed before the Roman legion, and the Greek became a vassal. Why this dire disaster?—Because Greece, spoiled by prosperity and warped by vain philosophy, could not brook to have its classic tastes and esthetic culture interrupted by family cares and family ties. Polybius, her own countryman and historian, writes that "the downfall of Greece was not owing to war or to the plague, but mainly to a repugnance to marriage, and to a reluctance to rear large families, caused by an extravagantly high standard of living."

Now what happened to Greece, what happened to Rome, may yet befall our own beloved country. It may die for lack of Anglo-Saxon men. The hour of need may come when, after great national calamities, after portentous reverses, the genius of this republic, disordered by an imperial grief, like that of the Roman emperor, may catch the burden of his cry, "Give me back, O Varus, give me back my legions!"

The women would never have known how to regulate their families to a few in number if the medical people could have had a "foresight" of any future evil resulting from such advice. The only hope now is that the physicians will see the error of their past experience, and advise their patients accordingly.

Some women will say, "My husband does not want children."

We admit it is occasionally the case. However, it has been my observation that the women are the most predominant in lessening the number of children.

There is no doubt that the medical profession can be the means, in a great measure, through moral persuasion, of prevailing upon their patients to abandon all preventive measures, when they are made aware of the danger of bringing ill health upon themselves, and also can be the means of preventing broken households and many divorce cases, also preventing degeneracy of their children because of unnatural relations between husband and wife; and great good can be done in a few years toward building up the general health of our women through proper advice and moral persuasion by the physicians.

The women are conscientious, and if they are advised as to the truthfulness of the injury resulting from these preventive measures by their family physician, many of them would heed the good advice given, and it would not be many years until the fashion of small families would be reversed. All households are happier with children. What is a household without young people? Children are the life and the spirit of the whole world.

The preventive measure of reproduction soon renders the women barren. Many cases have come under my observation, and those who wanted a child had to undergo a course of medical treatment in order to become fruitful, and even then some of them failed. As age rolls on, they see the error of their ways; they yearn for children too late. They have sinned against nature; they suffer self-reproach.

In olden time it was considered the greatest earthly blessing to a household to raise a large family of children. A woman who was barren was looked upon with reproach.

The Holy Bible tells us about the rejoicing of Rachel when she had a son for her husband, Jacob, after being barren for many years. Also Elizabeth, the wife of Zacharias, who was barren until stricken with old age, and when she found she had conceived, she rejoiced, and said, "Thus hath the Lord dealt with me in the day wherein He looked on me, to take away my reproach among men."

At the present age, with some nationalities in this country, their wives are reproached for not bearing children. A Swedish woman came to see me a short time ago for medical advice, in reference to her being barren. She said her people reproached her for not bearing a child for her husband.

Our Anglo-Saxon race, according to statistics, are fast becoming the barren race of the world. The burden of this national sin will lie on our American women. The woman will have to suffer the penalty of this depopulating of our country.

There is childlessness in thousands of our American households which are blessed with an abundance of means to raise and educate children of their own or orphan children. They are childless through

their own selfishness,—too much fashion, too much indolence, too much desire to have a good time. With some, children are too expensive, too much trouble and care.

The Holy Scripture teaches us, "I will, therefore, that young women marry, bear children, guide the house, give none occasion to the adversary to speak reproachfully." 1 Tim. 4: 10.

Why is the prevention of conception injurious to the health of women?—It is because the seed of the husband compensates the wife for that which he receives from her. In other words, the seed of the husband acts as a tonic for the vaginal walls of the wife. It is by this means God intended to propagate the human species. If anything is done to thwart that purpose, the woman suffers in consequence. The preventive measures have the same effect as masturbation upon the nervous system.

From this unnatural relation between husband and wife, comes dangerous nervousness, sleeplessness, a creeping sensation up the spine, a dull, heavy sensation across the loins; it will cause headache (brain trouble, as I have heard it described, as if there were wheels in their head), extreme irritability, barrenness, and often insanity.

The greatest hope is that all the physicians will perform religiously and zealously this medical missionary work in their offices, for the sake of humanity. Many a woman, when properly advised by her physician, will be profited by his or her advice.

The awful sin of the present century, which is alarmingly fashionable among our women, is criminal abortion, "infant murder." Any woman who commits a wilful abortion upon herself or has some one else produce an abortion upon her, is considered a murderess in the sight of God.

Any physician who performs criminal abortion upon a woman when it is not legal to do so, that is, when the mother or would-be mother's life is not in danger, but for gain, or to please the patient because she does not want a child, is considered a murderer in the sight of God. If it is proven upon him, that he performed the act, he is sentenced to the state prison for the term of twenty years.

I truly believe if our women were taught to know the reality of this crime, and the evils resulting from it, that many of them would not have the deed committed upon them. I believe their consciences would not permit them to have it done.

There are few women, nay, if any, who are born without some conscience. They would seriously think a good deal before they could get up courage to go to their physician and deliberately ask him to destroy their unborn infants, flesh of their flesh, and blood of their blood. It is not natural for them to do so. There is, when they premeditate this act, something wrong in their minds. They do not realize the gravity of such an awful sin.

Women have come into my office, in a cool, business-like manner,

and said: "Doctor, I am pregnant. I want you to do something for me to bring around my periods. I have just missed, and I thought it best to come soon, as I have heard if the courses were brought on early there is no harm in it, nor but little danger, if any. What is your opinion about it, doctor?" My method is to let them get through talking before I interrupt them. They truly believed their friends, that if there is no life felt, it is no harm. I have succeeded in many, or most cases, through moral persuasion and warning, in teaching them, from the very depth of my soul, the terribleness of this crime.

We are taught that from the very moment the male and female seed approach each other, they clasp together, or embrace each other, and immediately a thin covering, as it were, a film or shield, is thrown around this new life, the beginning of the formation of a human being. It takes up its abode in its mother's womb, the home for it, until the Lord is ready to bring it forth into this life, to live, move, and have its being.

The mother of this new life dwelling within her womb, the innocent of all innocence, deliberately destroys it, turns it out to die, even though she risks her own life in doing so. This is, in the sight of God, and according to the laws of our land, committing a terrible crime, and it can not be denied. A very few women, perhaps, may scoff at the idea of its being a sin, and it appears that they do persuade themselves it is no sin.

I have heard women argue, that in the early stages of pregnancy it was no sin, but that later on it might be a sin. Notwithstanding, if the physician is found guilty of this act, in early pregnancy,—if it is proven against him,—he is sent to the state prison just the same. No physician would ever be guilty of this infant murder if the women could be prevailed upon to let nature take its course.

It would be well for mothers to instruct their daughters before they marry, the consequences that they may expect to follow a marriage ceremony. If they are willing to bear children, get married; and if they are not willing to let nature take its course, it would be much wiser and better to remain single.

Those who do marry should put their trust in God, bear children, guide the house, serving the Lord, and the world will be better off for their having been born into it, and, according to Scripture teaching, their crown will be everlasting glory in God's holy city.

The causes of ill health in our children are many. In children we have the hereditary diseases, such as consumption, cancer, leprosy, gout, rheumatism, syphilis, epilepsy, paralysis, alcoholic tendencies, and insanity.

We have the enteric diseases, due to parasites, as worms, malarial diseases, typhoid fever, yellow fever, bubonic plague, cholera, cholera morbus, diarrhea, and dysentery.

We have the zymotic diseases, as the measles, scarlet fever, scarlatina, variola, whooping-cough, and the mumps.

We have croup and diphtheria.

In young infants we have hives and thrush.

We have various skin diseases, eczemas, etc.

We have nervous diseases, as St. Vitus' dance.

We have various diseases due to bad hygiene, bad drinking water, poor ventilation, improperly-cooked food, and poor food.

We have diseases due to cold, as pneumonia, erysipelas, bronchitis, catarrh, and la grippe.

Bad habits are formed in children in early life, or as early as eighteen months of age, for the lack of proper care from the mother or nurse, not knowing anything about how bad habits are formed in little children. They will acquire the habit of scratching the genitals, due to an irritation of the parts by uncleanliness, chafing of the parts from irritable urine, from pinworms or seat-worms, from too warm clothing, from stiff starched drawers, the seam of which will chafe little girls, and which should be loose, and never fit very close to the child.

Any or all of these will cause an irritation between the labia of little girls, and nature tries to heal the parts, and can not, because the irritation is kept up, causing an itching of the genitals. Hence, from the habit of scratching, is liable to be formed the habit of masturbation, which the writer has observed. Whereas, if mothers have the knowledge of these facts, and causes of such habits being formed in little girls, they can soon check the habit, by keeping the genitals clean, etc. Put one level teaspoonful of boracic acid into a half teacup of water; agitate it until dissolved. Wash between the labia with castile soap and warm water, dry the parts, and mop the boracic solution on for four or five minutes, then dry the parts, and put on oxide of zinc ointment made with pure vaseline, one and a half drams oxide of zinc to one ounce of vaseline. The little girl should be taught that she must tell her mother or nurse when she itches about these parts.

Little boys, very early in life, will form the habit of pulling the penis, which should not be allowed. I have known of cases of little boys masturbating, due to phymosis, a stricture of the prepuce, or foreskin, which causes a smegma-like substance to form behind the stricture, setting up an irritation of the organ, causing an itching, and the habit of scratching for present relief will, in all probability, lead the boy to form the habit of masturbation. The boy must be circumcised as the only true method of cure. Worms and irritable urine are responsible for the habit of masturbation in both sexes. Bad associates are alleged to be the cause sometimes.

The irritation above mentioned has, in my observation, been the cause of masturbation in every case brought to me for treatment, whether boy or girl.

The writer firmly believes the habit can, in a great measure, be

checked almost entirely if mothers and nurses can have the knowledge of the causes of bad habits being formed in early life. The rule should be, cleanliness all the time, especially cleansing the children before putting them to bed. The children should be taught from babyhood that they must be washed every day to keep well and healthy. If the habit of cleanliness is taught to children in early life, very few of them will depart from it in manhood or womanhood.

Every male child born should be examined at birth, to see whether it is perfectly formed. The foreskin should be especially examined. If prepuce, or foreskin, can be made to push back partly over the corpus cavernosum or partly over the head of the penis, just so that the meatus or opening of the mouth of the urethral neck of the bladder can be observed, the boy is all right. But if the prepuce, or foreskin, can not be pushed back so as to see the mouth of the neck of the urethra, and if the foreskin has the appearance of a drawstring around the end of it, the child has a stricture of the foreskin. An operation is highly essential. Circumcision should be performed early, after ten days or two weeks of life. The Jewish plan is good. Dilation of the foreskin is not a good method. The stricture returns.

If there are any animal parasites, pinworms, etc., they should be treated for worms. If there is irritation from urine, causing an inflammation of the urethra and prepuce, it should be treated by your physician, or by a specialist. If the irritation should be due to any rectal troubles, causing irritable nervous trouble, complicating the inflammation of the urethra in girls, or foreskin in boys, and no stricture present in the boy's case, the best medical skill should be employed to take charge of the child's case.

Every mother should have her boys examined, under the age of manhood, and if such trouble as stricture exists, have it attended to at once. Quite a number have come under my observation since I have commenced this missionary work. If boys thus afflicted are circumcised, this will prevent future weaknesses from arising, and bad habits will not be formed.

The Cause of Hysterics in Children.—The most predisposing causes may be ranked heredity, improper educational methods, neglect of physical health, the ill effect of bad examples, unusual hardship, climate, and depraved condition of the blood.

Grasset, Briquet, Amann, and others give statistics to show the more or less direct transmission of the disease from parent to children, especially from mother to daughters. In such cases both the inheritance and the influence of parental examples may assist in producing the disorder. The inheritance of hysteria, as of other nervous diseases, is not often direct. The neurotic constitution is the most frequent predisposing cause.

The tubercular diathesis, or consumptive tendencies, and catarrhal tendencies in children, also syphilis, chorea or St. Vitus' dance, poor or

badly cooked food, imperfect ventilation, too little sunshine, overheating, exposure, want of cleanliness, bad hygienic surroundings, will lead to developing of hysteria and other nervous affections in many children. Habitation often has a marked tendency to the development of hysteria. Chilly, sunless apartments, which are poorly ventilated, sap nervous vitality from little children. Children should live in sunny rooms, with southern exposure. They should be given the preference of the best sunny apartments.

Bad educational methods may act as a predisposing and exciting cause in children. About examination times in schools, hysteria is often manifested. Social conditions are occasionally active in the development of hysteria. In our large cities many houses are so poorly supplied with grounds, yards, or courts for out-of-door exercises for children, that hysteria is developed in consequence.

Parents should supply their children with indoor amusements, as games, etc., and take an interest in their amusements. Only by proper indoor and outdoor life can nervous breakdowns be avoided.

Many observations have been made by Mitchell and Lewis and others, on the effect of climate and seasons, on chorea in children, who are often hysterical in nature.

Various disturbances of the sexual organs are predisposing and exciting causes. Also masturbation is, undoubtedly, a very common cause, in both boys and girls. On the weak and sensitive children it produces various forms of nervous breakdown.

Hysterical symptoms sometimes develop in children, apparently from the result of their being in the company of their seniors.

The lack of moral training received by the children of hysterical mothers is a cause of hysteria. Ill treatment, moral or physical, also fear or fright, or false accusations, will cause hysterical attacks.

Injuries in children and adults will cause a great variety of hysterical manifestations. I have known of young girls immersing themselves in cold water at the time of puberty, also during their monthlies, causing the most intense hysterics, through fear that they would not recover.

Fright will cause a sudden stopping of the menses, causing hysteria; also grief and regret will cause hysteria.

The physical phenomena are not so intense or persistent or multiplex as in older patients; and, therefore, a true, continuous, hysterical insanity, lasting for weeks or months, is not likely to be observed in early years.

Many children are born into the world not wanted. Through the mental or maternal impressions of the mother, or father upon the mother, not wanting a child, and through their lamentations and mental worry over the unborn child, they are likely to affect the child during its development. The child will, in all probability, simulate the actions of its mother or father as it develops into manhood or womanhood,

taking on its parents' actions, whatever they were, during the time it was developing or during the term of gestation. It is thought that through mental impressions the child may be impressed, or moulded, for better or for worse, according to the mental condition of the mother during that period of time.

When a woman is aware that she has conceived, or is pregnant, from that very moment she should commence to mould the character of her unborn child. She should take the greatest care of her health, both mentally and physically. Her thoughts should be of the purest character. She should cultivate the best principles; cultivate cheerfulness, and happiness, and kindness to all people; above all, cultivate charity, and patience, and faith in God; think of noble deeds, and cultivate honor, integrity, and justness to all people. It is necessary that the husband should take part in aiding his wife, through mental culture, for the good of the coming offspring. You want good blood, bone, and sinew in your child. Hence, you should eat good, nutritious food. Eat nitrogenous food, as eggs, meat once a day, drink milk, eat fruits and vegetables. Do not eat very much starchy food, such as bread or rice or cereals of any kind, after the seventh month of pregnancy; also, eat sparingly of pie, and cake, and candies. You do not want to lay up an over-accumulation of fat.

Take plenty of exercise, short of fatigue; keep the bowels open, and the mind occupied. To be idle is not good for the offspring or the mother.

The mother's hand that "rocks the cradle" bears the burden of the human race. Through the mothers the world is to be made better; through mothers' influence over their sons and daughters, from the time they are conceived until they are born, and through the influence and teaching of good mothers and Christian mothers, the sins of the world, the crimes of every kind, can be made to fade away, if all mothers and would-be mothers can be scientifically enlightened in the knowledge of the good influence that can be rooted in the child through good maternal impressions. No doubt many children are influenced for good or bad according to the mental impressions and surroundings.

If the mothers will look upwards to God Almighty for wisdom, for knowledge, and faith, as to how to care for their unborn children, He will bless them accordingly. The Holy Bible teaches that God forsakes not the woman in travail, if she puts her trust in Him.

There is no doubt that the mother can improve the condition of her offspring by keeping her mind and body in a healthy, active condition, moulding the character of her unborn child, that it may be brought to nearer perfection of humanity; that when born it will have a perfect body and mind.

The human species can be brought to such perfect development through the influence of mothers, that the coming generation can live a life of unselfishness, and self-sacrifice, and Christian love towards each other, and fulfil the ten commandments.

CHAPTER II.

GENERAL DISEASES OF WOMEN AND CLINICAL HISTORY OF CASES.

I will briefly mention the more common kinds of diseases, and of pain complained of, and the character, as far as they have any.

Most women, when questioned as to the character of pain of which they are conscious, will describe it as a dull, heavy ache. This is especially true of backache, which is the most common form we meet with; also of pain low down over the pubes, and across the lower abdomen. This is also the kind of pain felt in the groins and thighs and hips. Such pain, whether constant or only present on exercise or after fatigue, suggests some chronic trouble,—congestion, displacement, laceration, or remote results of acute inflammation. Chronic aches will vary in character. Pain in the back, confined to a small area at about the junction of the lumbar and sacral vertebra, and of a more burning character, is suggestive of some trouble with the cervex-uteri, such as endocervitis, more often laceration. A bearing-down pain, or a feeling of weight and pressure, as it is described, when less pronounced, is caused by a lack of harmony between the uterus and its supports, and an increase in weight of the one or a loss in strength of the other. Sharp pain is usually symptomatic of some acute condition, either inflammatory or of neuralgic origin, or due to spasmodic contraction of muscular fibers. If pain is in the abdomen and associated with fever, it suggests localized or general peritonitis; if without fever, either neuralgia or a peculiar hyperesthetic affection of the abdominal walls, that simulates peritonitis. If coincident with the menstrual flow, it has a special name,—dysmenorrhea,—which, however, throws no light on its causation. The seat of pain is a symptom of value. When situated in the lower abdomen—a very common complaint—if in the median line, just above the pubis, it usually indicates some uterine trouble; if at the sides, just above Poupart's ligament, or what is called ovarian region, it suggests trouble with the appendages, or it may be ovarian, or disease of the tubes, and is most likely to have its seat in the peritoneum, which invests the pelvic organs. Pains in the back have been mentioned. Pain in the hips and thighs, extending as far as the knees, is usually a symptom of pressure in the pelvis.

Disorders of menstruation relate to abnormalities of the menstrual function. These are amenorrhea, oligomenorrhea, menorrhagia, and dysmenorrhea.

AMENORRHEA.

This is a very common complaint. In the primitive form, it has to do with young women in whom this function has not appeared, and who are either suffering in some way, to suggest that its non-appearance may be the cause, or, while free from suffering, have so far passed the age at which it usually appears as to excite suspicion that there may be some trouble. A thorough examination (physical) is necessary, whether there is any, or have been any abdominal pains occurring monthly or not. If there is suffering, especially of a periodical character, a simple examination to determine the presence or absence of any abnormality, such as absence of the uterus, or atresia of the vagina, should be made.

Acquired amenorrhea has a variety of obvious causes, which must be carefully considered, and which the patient's history may throw some light upon. The most frequent of these is pregnancy, and it is often for the patient's supposed interest to conceal this condition, though it should not be overlooked. Atrophy of the uterus following childbirth, change of climate, especially when accompanied by a sea voyage, and obesity, are other frequent causes of amenorrhea.

OLIGOMENORRHEA.

This is said to depend upon general conditions much more than upon local.

MENORRHAGIA.

Menorrhagia varies in importance as a symptom with the time of life at which it occurs. It is not at all uncommon in young women or girls, and is then usually an expression of some general condition incident to adolescence. It may be caused by anemia, which is in turn the result of over-stimulation of the brain, lack of exercise, and neglect of the proper hygienic conditions; or it may occur in apparently healthy girls, presumably a symptom of local congestion. Usually rest, general tonic, and hygienic measures suffice for its relief.

In middle life, especially after marriage and child-bearing, and other causes, menorrhea develops. Prominent among these are endometritis, fibromyomata, and polypi of the uterus, and general debility. The cause is decided by an examination. The menorrhagia may be due to endometritis. If so, it is more apt to show itself by a prolonged menstruation, and that due to fibroids or polypi, by a profuse flow more hemorrhagic in character.

Menorrhagia occurring at, or about the time of the menopause, while possibly dependent upon that change, and a symptom of it, is yet so suspicious of either a fibroid or malignant disease, that a vaginal examination should never be neglected.

METRORRHAGIA.

This form is dependent, very much, upon the same conditions; it is hemorrhage from the uterus, occurring between the menstrual periods. This is so unnatural, or abnormal, that it should be thoroughly investigated. It should never be neglected. Endometritis and fibroids may give rise to this symptom, in their later stages. There may be added other causes, as pregnancy and its complications, and malignant growths. Pregnancy and malignant growth are apt to be accompanied by metorrhagia from the beginning, while the former usually begins with menorrhagia. The presence of tumor, and the usual sign of pregnancy, and the occurrence of pain, and foul discharge, is significant of one or the other, and a physical examination must be made to settle the question.

DYSMENORRHEA.

This is another abnormality of menstruation. It is painful menstruation. If the pain comes on a day or two before the appearance of the flow, it is due to some general disturbance of the circulation of the pelvic organs, or nerve supply, especially in the ovaries or uterus, and is usually characterized as neuralgia or congestive dysmenorrhea. If it comes on with the flow, it lasts for a day or two, and then ceases. It is usually due to some condition of the canal of the uterus, from the flexed cervix or long body of the uterus, or from cicitricial tissues filling up the uterine canal, etc., and is named obstructed dysmenorrhea. Where the flow is painless at its onset, but becomes more profuse, and shows a tendency to clot, the efforts of the uterus to expel the clot will be accompanied by severe, cramp-like pains. This may be called the spasmodic form.

Nearly all kinds are accompanied by pain in the back and in the lower part of the abdomen, and a bearing-down sensation, the congestion being mostly of this character, though, as a rule, milder. In the obstructed form the pain is usually very much more severe, more concentrated in the uterus, and accompanied by reflex symptoms, as nausea, headache, and often vomiting. The patient is sometimes thrown into a state of convulsions. This severe form of painful menstruation comes most usually from anteflexion or retroflexion of the body of the womb, or both.

The next most common cause of painful menses is an extremely sensitive condition of the os, and is sometimes accompanied by endocervitis, sometimes not.

LEUCORRHEA.

Under this head all discharges which are from the vagina will be included, except blood.

Vaginal leucorrhea is thin, creamy, non-viscid, and, as a rule, not very profuse. If it is due to acute vaginitis, it is accompanied by

heat and swelling of the vulva and vagina, and, when gonorrheal in origin, not unfrequently by urethritis. When chronic, the heat and redness disappear, and the thin, creamy discharge sometimes changes to a thick smegma-like secretion, which clings to the wall of the vagina.

Cervical leucorrhea is clear, like the white of an egg, viscid, and non-irritating. A thick, opaque, or yellowish discharge makes its appearance in clumps, at intervals, often only when some straining occurs, as during micturition or passing the feces, or on coughing or lifting. It is characteristic of endocervical catarrh. When the inside of the uterus (endometrium) is affected, the discharge is usually thinner than where it is purely cervical (in the neck of the uterus). It is very apt to be of a brownish color, due to some admixture with blood, and may have a slight odor. When the secretions from the uterus are considerably purulent, it suggests tubal disease.

A watery discharge is usually associated with only one of four conditions: pregnancy, with escape of liquor amnii, or hydatiform mole, fibroid tumor of the uterus, or hydrosalpinx, with the periodical escape of the contents of the tube. With the history of the case and physical examination, the differential diagnosis is made.

A foul-smelling discharge may arise from the retention of the normal secretions. This may occur as a result of atresia, following an operation. More frequently it denotes either the decomposition of material, as the retained products of conception, or the breaking down of abnormal growths, such as fibroids or malignant disease.

ENLARGEMENTS.

A patient very often becomes conscious of any enlargements of the external genitals. If acute, and accompanied by pain, it is most often a swelling of the vulvo-vaginal gland, either a cyst or an abscess, and occupies the lower part of the labium majus of the affected side. The other swellings of the external genitals may be hæmatoma of the vulva, to which the history will point, hernia, chronic hypertrophy of one or both of the labia majora, due to syphilis, and primary epithelioma of the clitoris or vulva. Swellings of the vagina are due to a prolapsed uterus presenting at the vulva, or prolapsed anterior or posterior vaginal walls, or a foreign growth, such as fibroid polypus, which has become extruded from the uterus into the vagina, or rarely an extensive epithelioma of the cervix, which has filled up the vagina, and can be seen protruding through the vulva.

Moderate enlargements of the uterus are not recognized by patients as such. The symptoms of enlargements of the womb are an increased feeling of weight in the pelvis, backache, pain in the thighs, with inablity or interference with locomotion, increased amount of leucorrhea, and frequent micturition. These are the local symptoms.

The reflex symptoms to which uterine enlargements give rise are quite common, and as important. There are nausea and vomiting,

headache, sensitiveness, swelling of the breasts, flatulence, constipation, and general nervous disturbances. These are often the only symptoms. The local manifestation being absent, the most common cause of enlargement of the uterus is pregnancy, sub-involution, and chronic metritis, fibroids, and malignant disease. The history will enable one to decide between these.

ABDOMINAL ENLARGEMENTS.

A woman is often unconscious of the existence of a considerable swelling in the abdomen, especially if unaccompanied with pain. Sometimes there is increased pressure in the pelvis, on account of bladder and bowel symptoms, frequent or difficult micturition (urinating), and constipation. Sometimes nausea is associated with other enlargements of the uterus, as well as from pregnancy. Shortness of breath on exertion, palpitation of the heart, sense of fulness after taking food in small quantities, flatulence, swelling of the feet and ankles, and pain in the legs, are hints of abdominal pressure. The patient is often conscious of a weight shifting from one side to the other on turning, or of an inability to lie on one side or the other, on account of discomfort in the lower abdomen. If the enlargement is due to ascites, it will be flattened at the top, symmetrical, bulging at the sides. If it is due to pregnancy or an ovarian tumor, it will be prominent in the middle, falling off rapidly at the side. If it is due to a fibroid, there will usually be irregularities of the outline. A physical examination by a specialist will soon decide the true conditions.

Disturbances of Function.—Those of menstruation have already been discussed. Others remain to be mentioned, viz., coitus, defecation, and micturition. Painful coitus is called dyspareunia. The most common cause of this is such extreme sensitiveness of the introitus vaginæ that intercourse may be impossible. This is characterized as vaginismus, and has various causes. Attempts at sexual intercourse may be painful where there is no vaginismus present. A very rigid, thick hymen may present an insuperable obstacle to intercourse, also an abnormally small vulva and vagina may be a cause. Congenital malformations, such as atresia of the hymen or vagina, must also be considered. In the absence of these conditions, coitus may be possible; but it is accompanied with pain, which is then usually due to abnormal sensitiveness of the uterus, its appendages, or surrounding tissues. A vaginal exploration only will determine the question. There are also cases where coitus is followed by general nervous phenomena, *i. e.,* cramps, fainting, headache, palpitation of the heart, and nausea.

DEFECATION.

Disturbances of the function of defecation are very common. Constipation may be said to be almost the rule with women, and a more precise knowledge of its various forms will be of material aid in judging its cause and applying appropriate measures for its relief.

The term itself is of varying significance among women. Some understand by it a difficult movement, even though it occurs every day, and at a regular time. Another woman would not call herself constipated, even though she did not have an evacuation for two or three days, provided that it occurred then without the use of medicine. Still another considers that her bowels act naturally, even though she is obliged to use some artificial means every day, provided such means are effectual.

There is one form which depends on a sluggish condition of the bowels, due, perhaps, to a loss of muscular power in the walls of the intestines, or to inefficient innervation. In this form the bowels fail to propel their contents along, and the rectum remains empty. There is, therefore, no desire to have a movement. There is another form where the trouble seems to lie in the upper part of the rectum. Feces accumulate in the descending colon and the sigmoid flexure, but fail to enter the rectum. The cause is usually due to some pressure within the pelvis or the rectum, due to a displacement of the uterus, or to some enlargement either of the uterus or its appendages, or to adhesions, and consequent immobility of any of the pelvic organs. There is still a third form of constipation, where the bowels do their work properly, and the feces are satisfactorily carried along to the rectum; but the expulsion power seems to be at fault. The patient can not use force enough to expel the contents of the rectum, unless they are very loose. The most common cause of this is a weakening of the muscular structures which constitute the floor of the pelvis by laceration during parturition. Or, if the perineum is not torn, and the muscular attachments even only stretched, this loss of power may result.

The least special form of constipation is that associated with affection of the anus, such as hemorrhoids, fissures, or fistula, where the pain is, that is sure to be occasioned by the act of defecation preventing the proper relaxation of the sphincter. Painful defecation is most often due to troubles of the anus, as above mentioned. Not infrequently it causes pain higher up: first, generally in the lower abdomen; and second, in certain organs, such as the womb or one of the ovaries, most often the left. The cause of this pain is sometimes obscure; in other cases it seems to be occasioned by the pressure of the feces upon a displaced and sensitive ovary, or a swollen tube, or even upon the body of the retrodisplaced womb. Sometimes the mere act of straining is followed by discomfort throughout the pelvis, which in some cases may persist for hours.

To determine which one of the various forms of constipation is present, a thorough examination of the pelvic organs should be made by the vagina, and rectum, if necessary.

The disturbances of the function of micturition which are noticeable are the frequency of the act and pain accompanying it. Sometimes frequent urination seems to be a habit, and is expressive of the nervous temperament of the patient. One of the most common causes is pressure of the displaced womb on the bladder; perhaps the uterus is enlarged, or there is some growth or swelling which prevents the proper distention of the bladder. Irritation or inflammation of the urethra, especially if it has extended to the neck of the bladder, is an exceedingly common cause, and cystitis, of course, is always accompanied by this disturbance of function. Alteration in the character of the urine will cause a frequency of the act.

Pain accompanying the act of micturition may, for the purpose of diagnosis, be considered as occurring before or after the act. If the pain is before the urine passes, it is usually symptomatic of some affection of the bladder itself, which may extend from the bladder side, so as to involve the neck, in which case the very beginning, as marked by the relaxation of the sphincter, is painful. If the pain is a little later in the time of occurrence, giving the sensation of an intense burning at the vesicle neck and running down the urethra, it suggests fissure or ulceration of the neck of the bladder, with or without urethritis. If the pain is felt only as the urine passes from the urethra, there is some cause at its mouth, and it should be looked for. It may be carbuncle, ulcerative process, polypi, or a prolapse of the mucous membrane. Irritation about the vulva may cause pain during or after micturition, from the urine trickling over the sensitive surface. The closure of the sphincter vesicæ at the end of the act may give rise to severe, cramp-like pain, just as its relaxation at the beginning. Examination of the urine should be made.

Reflex Symptoms.—They are the reflex symptoms, or those which affect other organs than those which are primarily the seat of the trouble.

It may truly be said that there is scarcely an organ of the body which may not be, and is not sometimes, functionally disordered as a result of disease of the pelvic organs. Even the eye and the ear are not exempt from this law. Sometimes these symptoms are wholly a result of the preexisting pelvic condition; sometimes they have been present before, and are only aggravated by it. One of the most obvious examples of a reflex symptom directly dependent upon the pelvic condition is the nausea of pregnancy. But the greater part of such phenomena are much more obscure. We will only point out a few of the more common reflex symptoms, which we meet with in the course of our every-day experience.

The digestive system is, perhaps, the most easily affected. The patients complain most often of the various aberrations of function to

which the stomach and bowels are subject. The nausea of pregnancy we have mentioned. But this symptom may be associated with other pelvic troubles. This is especially true of those conditions which are characterized by an increased size of the uterus, such as myomata or chronic metritis. Diseases of the ovary may be accompanied by nausea, and the nausea of dysmenorrhea illustrates again the close connection between the uterus and the stomach.

Other disturbances of function are very common. The various forms of dyspepsia, flatulency and constipation or diarrhea, need only to be mentioned to be recognized as the most frequent accompaniment of uterine disease.

The circulatory system has its share of reflex symptoms, which express themselves in palpitation, dizziness, fainting, and tingling or numbness, especially in the extremities; also flushing, incident to the menopause, and other irregularities of the circulation.

The manifestations on the part of the nervous system are manifold. Neuralgia in various parts of the body, headaches of various forms, cramps and paresis and sleeplessness, indicate but in a general way some of the forms in which pelvic disease may show itself in remote portions of the body.

Irritability, loss of self-control, from its incipient stages up to well-marked hysteria, inability to concentrate the attention, forgetfulness, and confusion of thought, are a few of the most evident manifestations.

The foregoing brief sketch of the general forms of reflex symptoms merely enumerate what may occur. The important point to decide in the given case is how far such symptoms are the cause of, or dependent upon, the so-called diseases of women. This is often very difficult, especially when the local symptoms are either absent or so overshadowed by the general and remote symptoms as to be overlooked. The innate skill of the practitioner, and a wide experience, show their real value here.

Francis H. Davenport, M. D., says, "Where pelvic symptoms have preceded the reflex manifestations, even though the former may have nearly or wholly disappeared, it is safe to suspect the local trouble as the cause." This is more apt to be the case if the first trouble followed some acute affections of the pelvic organs, as gonorrhea, a miscarriage, an attack of pelvic peritonitis, or a difficult or abnormal labor. Again, if the reflex symptoms are aggravated at the time of menstruation out of proportion to the normal effect upon the nervous system, it is sufficient to warrant the supposition that the uterus or its appendages may be at fault. An examination should be made to clear up the diagnosis.

CHAPTER III.

INFLAMMATIONS OF THE FEMALE GENITAL ORGANS.

INFLAMMATION OF THE VULVA.

The causes of the inflammation of the vulva (vulvitis) are due, as I have often found in young girls, to a severe cold settling in the pelvic organs, causing an acrid catarrhal discharge, and the lack of hygienic attention of those parts, due to lack of knowledge on the part of the patient; and modesty prevents her from mentioning her condition to her seniors until her condition becomes unbearable, and she seeks the advice of her physician; gonorrheal and septic inflammation such as belongs to or springs from cancerous ulceration of the cervix; the contact of irritable urine, and especially alkalinity of the urine, and in aggravated cases of cystitis, and the urine of diabetic patients. The author has now a patient, aged fourteen years, who has diabetes, and whose vulva is constantly becoming inflamed from the effect of the diabetic urine. Inflammation of the vulva is often caused by masturbation.

Acid urine in children will often produce an inflamed condition of the vulva. The urine should be examined to find the cause, and have it removed, ere it is too late. Many children form the habit of masturbation from rubbing or scratching the vulva to relieve the itching that the excoriating urine produces. Mothers should pay strict attention to the hygienic condition of the genital parts of their children. The vulva should be washed with pure castile soap and warm water, then rinsed carefully, and oxide of zinc ointment applied, keeping the parts clean.

In married women (also, sometimes, unmarried ones, too, for that matter) inflammation of the vulva is due to too frequent coition, and want of cleanliness. An excess of exercise in fat women will likewise cause it. The strumous diathesis, or an invasion of oxyuride from the rectum will cause it, in both young and old women. Only a few days ago I had to prescribe for an elderly woman, who was troubled with an extreme itching of the anus and vulva, due to oxyurides. I prescribed pumpkin-seed tea, followed with a dose of castor oil. (See chapter on worms.) After the bowels were thoroughly moved, and the rectum washed out, an infusion of quassia chips was prescribed to be injected into the rectum, while reclining, and the infusion retained. Following this, sulphur ointment should be applied with a syringe (a salve injector). This treatment is to be repeated every nine days, for three different times, until all the larvæ are removed.

The exanthemata will cause it, but merely as a part of the general implication of the tegumentary tissues and mucous structures.

Pathology of Acute Inflammation of the Vulva.—The surface presents the usual appearance of active inflammation, the lesion being most pronounced about the vestibule and the ostium vaginæ. Later the mucous glands may be obstructed, leading to a form of acne. The sebaceous glands on the outer side of the labia majora may also be involved, and complication of the vulvo-vaginal glands, one or both; they may become so inflamed as to suppurate, untimately, and discharge as abscesses, or, through stoppage of the duct, may be converted into cysts. Gonorrhea is said to be the most common form of this lesion. The persistence of any one of the causes will develop a chronic inflammation, which, in cases dependent upon urinary irritants, especially, will lead to a thickening, hardening, and fissuring of the inner labial surface. After gonorrhea, condylomata may develop about the vaginal orifice.

The most striking symptoms are those associated with gonorrhea, which we will leave to be mentioned in connection with vaginitis. Those inflamed conditions dependent upon exanthemata, or upon discharges from septic metritis, are lost sight of by the patient in the general discomfort. The acute symptoms are a sense of fulness in the parts, pain in the region, when walking or when touched, and consciousness of a discharge.

In the sub-acute and chronic forms, fulness and soreness in the region, especially after motion, are present. There may be excessive discharge, and, after urinating, there will be smarting. Soon after, pruritus appears, this being a prominent symptom in diabetes.

When the vulvo-vaginal gland is attacked, the patient usually presents a distressing look, the recumbent position, with legs apart, being the only easy one. Sitting and walking are both very painful. As the inflammation progresses, distending the tissues, the symptoms of a surface plegmon are developed, with more or less constitutional reaction. The gland involved is seen distended to the lower half of the labia majora, and is extremely sensitive to the touch. The orifice of the gland, not easily seen as a rule, is now red and pouting, and pus may be pressed from it. After a few days it may point and discharge upon the inner face of the labia, or it may empty itself along the duct, and subside or degenerate into a cyst at a later period. If it is of a gonorrheal origin, it will probably light up at some subsequent period.

The Treatment.—"Removal of the cause is the key-note." This may be impossible. If the gonorrhea was transmitted from the husband to the wife, the husband should be treated as well as the wife. The first step is to give an antiseptic vaginal wash, and thoroughly apply the lotion to the vulva. Cupri-sulphas from gr. ss to gr. j to one ounce of warm water. After having taken a hot vaginal douche, and after using the antiseptic lotion, rinse the affected parts and apply oxide of zinc ointment on salicylated gauze. You may pack the vagina

with salicylated gauze covered with the oxide of zinc ointment. The antiseptic lotion should be used from two to four times in twenty-four hours, according to the severity of the case.

In the acute form, poultices and sedatives and applications, as the lead and opium wash, are indicated, until inflammation abates.

℞: Plumbi acetas.....ʒ j
Tinct. Opii.....ʒiv
Aqua.....ℨiv
M. et fiat Latio.

Sig.: First wash the parts with an antiseptic wash, consisting of thirty drops of carbolic acid in a pint of warm water. Syringe the vagina and vulva, then rinse with hot water (not too hot), then apply the above lotion by saturating a piece of absorbent cotton and laying it between the labia and over the vulva, and a piece of oiled silk over this, keeping the legs apart. During the night, if the inflammation is abating, oxide of zinc ointment, or carbolic ointment, will allay the itching, and soothe the parts.

Zinc oxide.....ʒ j^{ss}
Vaseline.....ℨ j
M. et fiat. Unguentum.

Apply on lint, after first anointing the parts thoroughly. Use white castile soap for cleansing the parts, and rinse and dry the surface. Each time after micturition, the parts should be washed and the ointment applied. In chronic form, application of nitrate of silver is very beneficial.

Argentum Nitras.....xii to xv grr
Aqua.....ℨ j

Mix lotion.

Wash the parts, and apply the lotion for a few minutes; then apply the carbolic ointment for the itching. Oxide of zinc ointment will also allay the pruritus. Some recommend carbonate of zinc ointment. In all cases attention to the ordinary rules of cleanliness is necessary. If the vulvo-vaginal glands are implicated, first poultice with hot flaxseed, and then free incision. Wash out the cavity, and dress with antiseptic gauze.

INFLAMMATION OF THE VAGINA.

Etiology.—Owing to the susceptibility of the vaginal canal, and to its associated functions, if there is infection, traumatism is paramount. Its relations to the exterior permit in many ways the introduction to its recesses of morbid germs, which in the absence of a fitting culture medium, may remain in such a state of attenuation as to be innocuous. But the canal is the channel of outflow for the menstrual blood, together with other secretions, and the excretions of the uterus—fluids which may come from the non-

infected uterus. But at times these are appropriate culture mediums, and germs already present may quickly multiply and set up inflammation. I have had a case recently where the vaginal outlet was wounded from a fall from a bicycle, the patient falling astride of some broken part of the wheel, and puncturing the anterior osæ-vaginæ. Inflammation resulted. Germs were already present, and acute inflammation followed. Hot vaginal douches, with rest in bed, with laudanum and lead lotion, soon relieved the acute conditions. With aseptic dressing, and keeping the bowels in a lax condition, she soon recovered.

In the virgin the vaginal orifice is protected by a special membrane, the hymen, so that the entrance of germs is hindered under the ordinary conditions of atmospheric pressure; but after parturition the orifice is often widened so that air may have easy access, especially with the individual in a recumbent position. A lacerated perineum will permit such easy access of the air that the woman can not bend over without the consciousness of her deplorable condition.

The lowering of the general systemic powers will often predispose to inflammatory conditions of the vaginal canal, with other mucous tracts; for instance, measles and scarlet fever, with the exfoliation of the epithelium, present a surface easily infected.

Exposure to cold; excessive coitus; irritant injections and applications; the pressure of a pessary; masturbation; oxyurides; the contact of the vesical or rectal contents, as in fistula; irritating discharges from the direction of the uterus, as in simple or septic metritus or carcinoma; the extension of vulvitis, as in children with acid urine, or in women with diabetes; struma; uncleanliness; and the traumatism and infections attendant upon parturition, or upon abortion, or operations—all these are other causes. But perhaps the most important of all is the eternal and everlasting gonorrhea, which our dear good women have to be afflicted with, innocently and unconsciously, because of the unfaithfulness of their husbands. *Vice versa,* sometimes, with shame upon her.)

The virulence of this cause, its tendency to wide extension, its ability to lie latent for extensive periods in various parts of the genital canal, and then reappear in force, make it the most trying factor to deal with in vaginal diseases; its virility seems to be due, it is said, to a specific germ,—gonococcus. According to Pozzi, its role was long undisputed, the facts proving its preponderating agency appearing to be easily demonstrated. Most numerous in the acute stage, rarer in the chronic form, the germs increase or diminish in number according as the disease is active or latent. They are found in gonorrheal discharges from the urethra, the glands of Bartholini, the rectum, in gonorrheal salpingitis, and in purulent ophthalmia. They have been discovered in the blood, and in the articular synovial fluids of patients suffering from gonorrheal rheumatism.

Pathology.—According to C. Ruge, we find this disease commonly

presenting itself under three forms, simple, granular, and senile vaginitis. A fourth form, present in pregnancy, is added, called emphysematous. It is rare for the entire surface to be involved, the disease presenting itself usually in patches or zones, with healthy tissue intervening. If, however, the whole surface is involved, it is in the acute stage of gonorrheal, exanthematous, septic, or traumatic inflammation, dependent, under the last head, upon caustic or scalding hot injections. In the simple form the surface is smooth, but here and there patches of thickened tissue are seen. In these spots the papillæ are swollen, and the neighboring tissues are infiltrated with small cells, epithelial layers alone partaking in the proliferation. In the granular form, the more common variety, the papillæ are infiltrated with small cells, and so enlarged that they greatly encroach upon the intervening spaces.

In chronic vaginitis the patches of disease are in places ecchymotous; in others, denuded of epithelium, leaving raw surfaces, which may, when opposed, adhere, tending to obliterate the canal.

The gaseous form belongs to pregnancy, but it may be present without it. The gas is said to be situated in the meshes of the connective tissue, though the lymphatic capillaries are said to be the place of its development.

DIPHTHERITIC VAGINITIS.

This is merely the local expression of a general condition, and is marked by a greatly-swollen mucous membrane, which is more or less covered with neurotic tissue. It belongs to the puerperal state, and to such infectious disorders as measles, smallpox, and typhus fever. It is mostly an intense septic process engrafted upon a simple inflammation, which may result in extensive loss of tissue. Deep-seated inflammatory changes in the subjacent coat are seen in consequence of the action of caustic or scalding hot douches (accidental events), and localized, deep-seated, ulcerated changes may be present in consequence of a neglected pessary.

Abscesses.—These are the results of either inflammation of a cyst of the wall, of traumatism, forceps delivery, or of a development in the course of grave febrile states, and may also be present.

Symptoms.—Acute vaginitis is indicated by a dull pain and a sense of fulness in the lower pelvic region. Pain and discomfort are increased by micturition, by defecation, and by walking. The discharge tends to increase rather than to diminish, especially if the case be one of gonorrheal origin. The gonorrheal symptoms are burning pain in urinating, and vesical tenesmus, which indicates, with fair certainty, the causative agent to be gonorrhea. Also may be mentioned the presence of inguinal pain and tenderness, due to the implication of the inguinal glands. An examination shows the vaginal canal to be sensitive, to be hot and swollen, and, at a later period, roughened.

If the urethra be involved, it will be found thickened and tender, and a pressure along its course, from within outwards, may drive a drop of pus from the meatus. Pus from this quarter is said to be conclusive evidence of gonorrhea. If the bladder be infected, pressure upon the anterior vaginal wall will quickly reveal the fact by the marked increase in pain which is produced. Inspection may show the presence of acute vulvitis; and, if so, the orifice of the vagina, the orifice of the vulvo-vaginal glands (especially in gonorrhea), the vestibule, and the meatus are the parts chiefly involved. All will be covered by a muco-purulent or purulent discharge. If the vagina can be inspected, its walls will be found covered with a similar secretion, under which, as in the vulva, the tissue is seen to be swollen and of a deepened red color.

An acute vaginitis may pass into a chronic vaginitis, if the conditions be neglected, if the patient be of enfeebled constitution, or if the disease be gonorrheal. If the disease is from gonorrhea, it may be latent in its places of retreat,—the posterior and anterior fornices discharge—leucorrhea. It may follow the acute stage, but most usually adequate irritation is forthcoming.

Chronic vaginitis presents no special local symptoms other than discharge—leucorrhea. It may follow the acute stage, but most usually is from the first a sub-acute or chronic process. Such vaginitis develops in consequence of the discharge from the uterus, or as the result of senile changes. In senile vaginitis this discharge is sero-purulent, and yellowish, and occasionally brownish, from admixture with blood.

Leucorrhea originating in the vagina may be thin and whitish, or thick and yellowish, and purulent. The former is indicative of the milder grades; the latter shows the more severe ones.

The most striking development of leucorrhea is seen in fat, lithæmic women, and in strumous subjects, and is often rebellious to treatment. If a dirty or ill-fitting pessary is used, the discharge will be indicative of the kind of lesion produced; for, in the event of ulceration of the wall, a purulent or even blood-stained flow may appear. And just here it is well to mention that, following the use of douches which are too hot, or those which contain an excess of caustic ingredients, such as carbolic acid, and following certain septic and exanthematous disorders, the discharge soon becomes purulent, and perhaps bloody, and may also contain shreds of the exfoliated epithelial covering of the vagina.

A simple vaginitis rarely involves the general health: but if it causes profuse and prolonged discharge of any kind, especially if it is purulent, it will surely depress the general health. This will be manifested by loss of energy, by gastric disturbances, and perhaps by constipation and loss of nerve control.

Diagnosis.—Simple vaginitis is not infectious. Gonorrheal vaginitis is always infectious. It is not always easy to distinguish one

form of vaginitis from another, and yet the fact that one variety is infectious is enough to render a distinction important.

Gonorrheal vaginitis is marked by the sudden onset, the virulence, and course of the disease, as well as the prompt implication of the urethra, and perhaps of the bladder, the involvement of the vulvo-vaginal ducts and glands, and later by the tendency of the disease to invade the uterus and to extend to the adnea. The development of conjunctivitis also points to the gonorrheal nature of the disease, and in the absence of pregnancy the appearance of vegetation in the vagina is additional proof in the same direction.

Inflammation of the vagina due to cold or to catarrhal conditions of the mucous membrane is infectious, and can be transmitted from the wife to the husband. The author had a case of that kind. The wife had an acute cold, temperature 100 degrees Fahr., had a watery discharge from the vagina; and the husband, too, had a cold, but no fever; under the existing conditions cohabiting was indulged in, and in a very short time the husband had symptoms of gonorrhea, as his physicians informed him. His wife was about seven months along in pregnancy at the time. Upon her husband's return from the physician's office, he made known his condition to her, and asked her, "What does this mean?" She, in turn, said to him that she wanted him to answer that question, as he knew her condition, and that she had always been a faithful and loving wife. He replied that he knew that he had never been otherwise than true to his marriage vows. The author was sent for to examine the wife, and give her diagnosis of the case. Upon examination, I found vaginal inflammation, with an acrid and profuse watery discharge, and temperature 100 degrees Fahr., and all the other symptoms of an acute cold. The assurance of the contagion was made known to him, and with the proper treatment she soon recovered; also the husband. Advice was given to them to occupy separate beds when either of them had an acute cold. The treatment prescribed was quinine, small doses of calomel, followed with a saline laxative and hot vaginal douches, with a little carbolic acid in the douche, and rest in bed till well. The husband soon recovered from his cold, and the supposed gonorrhea was relieved. This occurred ten years ago, and there has never been any sign of a return of the trouble in either of them since.

Simple vaginitis is easily controlled and cured by keeping the patient at rest, by freely moving the bowels with mild cathartics, viz.,

Calomel.....1-10 gr.
Soda.....1 gr.

Given every hour for five hours.

In six hours after the last dose of calomel has been administered, a dose of castor oil, or a dose of Epsom or Rochelle salts, may be given to move the bowels freely. Give hot vaginal douches. The temperature of the water should be about 105 degrees to 110 degrees Fahr., and about

one gallon should be used three times a day. The patient should use it lying on her back. To the hot douche may be added from two to three teaspoonfuls of borax to one gallon of water. The patient should take a tonic of iron, quinine, and strychnia.

℞: (J. Wyeth & Bros.)
Elixir Ferri, et Quinæ Sulphas, et Strychnæ 6 oz.
Sig.: Teaspoonful, for an adult, after meals, in a wine glass of water.

In gonorrheal vaginitis, or inflammation of the vagina, rest in bed, and give half-grain doses of mild chloride of mercury, with two grains of soda, two hours apart, until three doses have been taken. In eight hours take a heaping teaspoonful of Epsom salts in a half tumbler of water, to move the bowels freely. Give hot vaginal douches, the temperature of the water 100 degrees Fahr., with bichloride of mercury in the strength of 1 to 10,000. The douche nozzle should be glass or hard rubber. One gallon of the antiseptic water should be used three times in twenty-four hours, the patient lying on her back. If the introduction of the nozzle is painful, apply a six per cent solution of cocaine on a bit of absorbent cotton, at the ostium vaginæ, for a few minutes, and the nozzle can be made to pass in easily. Or anoint the nozzle with cocaine ointment, and it will relieve the pain. Keep the bowels free with saline mixture of Rochelle and Epsom salts. As soon as acute symptoms have been abated, Doctor Polk advises the vagina to be washed with soap and warm water, using the fingers, or, if possible, a sponge upon a holder, to reach the inequalities of the vaginal surface, cocaine being used to lessen the pain if necessary. Then introduce a Ferguson's speculum, and, beginning at the cervix, paint over the entire surface, as the speculum is slowly withdrawn, with a solution of bichloride of mercury, 1 to 1,000. Then wash out the vagina with warm water, re-introduce the speculum, and place in position a piece of sterilized gauze of three or four thicknesses, the gauze to reach from the posterior fornix to the ostium vaginæ. By this measure the vaginal walls are kept apart, and free drainage is provided for. This treatment to be repeated daily until the disease is conquered. If at a later period the tissues should need stimulation, then paint the surface with tincture of iodine.

In the chronic form of vaginitis the author has found the galvanic current very beneficial. The vagina is first washed with an antiseptic solution (if not gonorrhea) or carbolic acid douche (acidi-carbolici ʒij, water 0). Then bits of absorbent cotton are packed around the uterus, covering it with the cotton, which has been wet with warm carbolized water. As the speculum is withdrawn, pack in the absorbent cotton till the vagina is filled down to the ostium-vaginal. Place a broad, flat electrode over the abdomen, just above the pubis, covered with several thicknesses of absorbent lint, it being made positive, and place a small,

round electrode—carbon, zinc, or aluminum is preferred—about the center of the cotton packing, using care that the negative pole is insulated with rubber, so that the labia do not touch the electrode. Give from twenty to fifty milliamperes, if it is bearable. The treatment should be from ten to twenty minutes. Remove the cotton, make an application of nitrate of silver, from ten to twenty grains to the ounce of water, then lay in several thicknesses of salicylated gauze, covered with oxide of zinc ointment, being careful to place it around the uterus, keeping the vaginal walls apart, and having a string attached to the strip of gauze, and extending to the outside of the ostium-vagina. This treatment may be continued daily until the patient is relieved, when the application of the galvanic current need not be applied more than two or three times a week; but the hot carbolized douche may be given daily, with nitrate of silver solution applied, and followed with oxide of zinc ointment covering the salicylated gauze, placed as above described, to prevent the vaginal walls from touching. The patient should have a nutritious diet, take tonic of iron, quinine, and sulphate of strychnine. Wyeth's Elixir is a good tonic, given as above prescribed, and keeping the bowels regular. If there is struma or oxyurides, use the means prescribed for pin-worms; or if struma, give cod-liver oil and tonic.

URETHRITIS.

This occurs in cases of gonorrheal vaginitis. Doctor Polk recommends washing out the urethral canal with a 1 to 20,000 solution of bichloride of mercury, using a small, glass-nozzle syringe. This should be repeated every day if necessary. The author has found it will give relief to wash out this canal night and morning with cuprisulphas, from gr. ss to gr. 1, to the ounce of water, warm. Then rinse with sterilized water, washing the meatus after micturition, and applying oxide of zinc ointment. Diluents are useful. Flaxseed tea, with infusion of buchu, if taken at intervals of two or three hours, and salicylate of soda, five grains taken three times a day till the patient is relieved, are beneficial in keeping the urine in a favorable condition. Small doses of quinine, from one to two grains, given at the time that the salicylate of soda is administered, are also very beneficial. Stimulating diet and stimulants must not be indulged in. Milk diet is preferable; oatmeal gruel, or corn-meal gruel, chicken soup, milk toast, eggs in milk twice a day, are the best diet in all inflammations of the pelvic organs while in the acute stages.

In deep-seated inflammations of the vaginal wall, the first step is to reduce the inflammation and relieve the pain. Give hot vaginal douches, with boracic acid, one teaspoonful to one quart of water. The patient should be in a recumbent position. Anodyne suppositories should be given by the rectum, or vagina, or by the mouth, as deemed appropriate.

The vaginal walls should be kept apart as the inflammation subsides, to prevent adhesions between the walls, or, where sloughs have occurred, to prevent atresia. Keep the surfaces apart by strips of gauze soaked in mild astringent solutions. Acid sulphurous,—oz. ij to water oz. iv,—is a most excellent solution for this purpose. Wash the sloughs with a small syringeful of water, letting it remain in contact with the affected part a moment, and then dry the parts, after which use a strip of gauze thickly covered with oxide of zinc ointment, to keep the surfaces apart. After using the sulphurous solution, if stimulation of the affected parts is necessary, nitrate of silver wash, ten to twenty grains to the ounce of water, may be used. Never use the wash cold; warm washes give more comfort to the patient; the cold produces a shock. When a warm solution is used, the patients do not complain of pain.

In gonorrheal vaginitis urethritis occurs as a part of the gonorrheal form. The urethritis is best treated with an application of a four or six per cent solution of cocaine, with a small, glass-nozzle syringe. Follow this with a wash made of sulphate of copper, one to two grains of sulphate of copper to one ounce of water. I have often found one-half grain of sulphate of copper to one ounce of water to be strong enough to effect a cure. First cleanse the parts with boracic acid in hot water, and syringe the urethra with boric solution, twenty grains to one ounce of water; then rinse with hot water, and apply the sulphate of copper wash; after which dip a small piece of absorbent cotton in an oil lotion,—linseed oil four ounces, spirits of turpentine one drachm,—and apply to the urethra. The urethra should be treated three times in twenty-four hours, in the first stage of the inflammation, till the inflammation abates, after which night and morning will be often enough to use the copper solution.

Corrosive sublimate is used by most all specialists for irrigating the urethral canal, in the strength of 1 to 20,000, and repeated every day if necessary. The administration of diluents is necessary, also non-irritating diet; use milk, malted milk, rice soup, oatmeal gruel. If the urine is acid, five grains of salicylate of sodium taken in half a teacup of flaxseed tea, three times a day between meals, acts well in keeping the urine from being irritable. To be taken until relieved.

In all deep-seated inflammations of the vaginal wall, a biborate of sodium douche should be used every four to six hours. When inflammation abates, keep the vaginal walls apart with gauze soaked in a mild astringent solution. An application of nitrate of silver solution, ten to fifteen grains to the ounce of water, is better; then dip the strips of gauze in linseed oil, as above prescribed, and lay them in, well up around the uterus and along the vaginal wall, keeping the walls apart to prevent adhesions.

Abscesses will have to be treated by free incisions, douching the canal with antiseptic douches and dressings of iodoform, or bichloride,

or salicylated gauze. In all cases of inflammation of the vaginal canal, tonics are necessary to prevent unfavorable reaction upon the general system. Gude's pepto-mangan of iron, with a little strychnæ, is an excellent tonic.

(Gude's) Pepto-manganate..... ℥xii
Tr. nux vomica..... ʒ iss

M. et Sig.: Dessert-spoonful to a tablespoonful after meals, in a wineglass of milk or water.

INFLAMMATION OF THE UTERUS.

There are various agencies which cause metritis and endometritis. Germs gain access to the uterus through the vaginal canal, as in case of vaginitis due to gonorrhea. Autoinfection, growing of the negligence of careless doctors and nurses in allowing decomposed blood or decidual material to be retained, should not escape notice. Infection resulting from a combination of causes may find a resting-place in the cervical canal. The fornices of the vagina likewise afford refuge for such products. Other causes of greater importance, because more common, are the microbes common to inflammation elsewhere, such as in the surgical infections in erysipelas, diphtheria, and as in scarlet fever and measles; septic infection from wounds, as in case of abortion; also from puerperal septicæmia caused by different germs.

Violent congestion of the uterus, such as occurs in acute suppression of menstruation, and in prolonged congestion growing out of flexions and versions of the uterus, especially when these malpositions are bound down by adhesions, are prominent factors in producing inflammation of the uterus. The irritation of the organs incident to the action of stenosia in retarding the escape of purulent blood, is another cause; also the irritation of excessive coitus, especially at the time of menstrual congestion.

Accidents which are classed under the head of traumatism are patent for evil. Of these, injuries from labor and abortion stand first in gravity. Operations upon the cervix which lack in precaution against sepsis, are often conclusive as to their influence; also improperly cleansed sound, and occasionally the action of cold douches, if taken at the time of menstruation.

The inflammation about the cervix, due to ill-fitting pessaries or neglected pessaries and lack of cleanliness, will easily involve the deeper parts of the uterus; also any inflammation of the vagina, no matter how induced.

In scrofula, constitutional syphilis, extreme lithæmia, chlorosis, and anæmic states of the blood, the resistance of the mucous tracts in general is lowered, so that agents of disease easily resisted under better conditions are here potent for evil. The influence of such conditions

in retarding cure is equally evident, and active constitutional treatment is called for, as well as local measures.

Symptoms of Metritis and Endometritis.—The symptoms increase with the depth and extent of the lesion. In simple acute endometritis they may be comparatively insignificant. There will be a sense of fulness in the pelvis, which will be more pronounced if there is an arrest of the menstrual flow, but which is relieved should the flow come on. Frequent micturition and rectal tenesmus may be present, and slight malaise and want of appetite.

In more severe cases the above symptoms are more pronounced, and there is dull, deep-seated pelvic pain,—backache,—in the upper sacral region, and aching pains down the inside of the thighs. All these local symptoms are increased by motion, micturition, movement of the bowels, and coughing. Slight fever will be present, with a loss of appetite, and a tendency to constipation.

Septic cases, or blood poisoning, may occur after improperly performed operations, and especially after abortions and labor cases, and they present the most aggravated and pronounced symptoms. Blood poisoning from abortion and from labor presents itself by a chill, more or less pronounced, and general disturbance of the whole system, followed by a rapid rise of temperature, which lasts for a few hours, then falls and rises again at a later period. The elevations are more frequent in the later hours of the day. If the inflammation extends to the peritoneal covering through the uterus, the phenomena of local peritonitis are directly added; if through the Fallopian tubes, the evidence of tubal disease appears, to be followed by those of local peritonitis. Extreme symptoms indicative of septic absorption and constitutional infection may develop, such as would come from absorption of the poison through the lymphatic carriers, or the scattering of infected thrombi through the body. The extension of a septic endometritis and metritis in cases of absorption and labor, in all the ways just mentioned, is a common event in consequence of neglect; but in the non-pregnant uterus even a septic inflammation travels onwards, as a rule, more easily by the way of the tubes than through other channels, so that in such cases the phenomena of salpingitis and peritonitis are more prominent than those of septic absorption alone. The extreme symptoms, however, do not belong to the history of acute endometritis and metritis met with in the non-pregnant uterus. Salpingitis and local peritonitis, with their particular evidences, represent the extreme of extension in such cases, the poison of gonorrhea being responsible for most of the cases.

Symptoms.—Pressure upwards upon the cervix causes pain, as a rule; the tenderness of the pelvic region is such that the uterus can not be satisfactorily mapped out; and if it can be, it is, as a rule, slightly enlarged. The tenderness is often diffused over the entire pelvic area, or nearly so. When dependent upon vaginitis, the outer surface of the

cervix will be deep red, and covered with muco-purulent or purulent discharge, often bleeding to touch.

In septic inflammation, especially following operations, abortions, or labor, in addition to traumatism incident to such conditions, the cervix is much softened, enlarged, and of a deeper color. There may be a thick, ichorous, bloody discharge flowing from the cervix, which may or may not have the odor of decomposition.

These are especially pronounced features after abortion or labor. In the latter conditions, gray patches of necrosed tissues may sometimes be seen. This is the so-called diphtheritic type of inflammation already mentioned.

Diagnosis.—Inquiry into the symptoms and signs will always reveal this lesion in the non-pregnant uterus, and, with few exceptions, the same statement is true of the uterus after labor and abortion. Occasionally it begins so insidiously, and with such a resemblance to malarial infection, that one may be deceived; and if, as often is the case, no pain, no tenderness, and no odor of decomposition in the discharges be present, the deception may be complete. As a rule, such cases are of late development; but, early or late, they are dangerous. If it is malaria, the free action of quinine should make the differentiation. The mammary glands may be inflamed, and careful examination of the breasts failing to reveal the cause, the uterus should be carefully examined in its interior, and treated.

The mere absence of lochial discharge from the vagina is a suspicious event in these cases, for it generally means retention, by obstruction from flexure of the uterus or other causes; but if a discharge is present, its freedom from odor of decomposition is not a safe guide. The condition of the uterus as a whole is of some service, because arrest of involution is an accompaniment of all these lesions. In all suspicious cases it is proper to give antiseptic treatment of the interior of the uterus. It is safer in all such cases to take the risk of interference rather than that of delay. It is said by eminent writers that, for reasons dependent upon the depth, the degree, and the rate of infection, twenty-four hours should be the outside limit of delay of this antiseptic treatment, which will be spoken of later on.

Prognosis.—There is danger to life and danger to the organ. In simple acute endometritis and metritis life is rarely endangered; but in the septic forms of the disease it commonly is, either through general peritonitis or through general septic infection.

The integrity of the organ is always endangered, but the danger is in proportion to the severity of the inflammatory process. In the milder forms it is only slight, but is pronounced in the graver forms. This results in part from the chronic changes in the uterus itself, the offspring of severe acute processes, and in part from the implication of the adnexa and surroundings of the uterus,—implications in the shape of tubal and ovarian diseases and peritoneal adhesions, which, so

long as they exist, may render impossible the return of the uterus to its normal state.

The influence of all this upon menstruation and child-bearing is self-evident. It is said by eminent and experienced physicians that the prognosis as regards life in the milder forms of this lesion is good; in the graver forms it is serious, and may be very bad. As regards recovery of normal functions and structure, it is largely dependent upon the resultant complications. The question of prognosis turns as much upon treatment as upon the original nature of the disease. The principle of antisepsis, prompt and intelligent treatment, improves to a wonderful degree the prognosis in all cases, no matter how grave at the outset.

Treatment.—The milder forms of acute endometritis and metritis are best treated by rest in bed, together with free purgation with saline cathartics, and copious hot vaginal douches, temperature from 110 degrees to 115 degrees Fahr. At least four quarts of hot water should be used at a time. They should be taken with the patient in a recumbent position, lying on the back, with a bed-pan beneath the buttocks. They should be given once every three or four hours for at least twenty-four or thirty hours. A rapid depletion can be secured through free scarification of the cervix, which, if done in conjunction with a warm douche, temperature 106 degrees Fahr., will insure sufficient bleeding to aid materially in arresting the disease. As soon as the acute symptoms have been controlled, cotton tampons soaked in glycerine and ichthyol should be placed against the cervix daily. By this means we still further aid resolutions, and by the support used add to the patient's comfort. The douching and the introduction of the tampons can be managed, in case of necessity, by the patient and her nurse, after some little instruction, but the scarifications can be properly done only by the physician. The cervix may be exposed by means of a speculum, and then, after cleansing its surfaces carefully, and scarifying freely into its depths at four or five places, keep up the bleeding by a flow of warm water, as already noted. Should the blood continue to flow too long, a hot douche—115 degrees Fahr.—will speedily control it. Hot flaxseed poultices, applied over the hypogastrium, will control the pain sufficiently to render unnecessary the use of an opiate; but if they can not be omitted, then use them as a rectal suppository, one or two doses being amply sufficient for any ordinary case. One-grain suppository of opium by the rectum, once in eight hours, till relieved.

The more aggravated forms of endometritis and metritis are met with in gonorrhea. They should be supplemented with measures directed to the interior of the uterus.

If vaginitis is present, the treatment appropriate to the disease in the canal should form a part of the procedure; for, so long as it remains here, reinflection of the uterus may take place. The cavity of this organ should be treated upon the same principles that govern the specific treat-

ment of gonorrheal urethritis in either sex. As the internal os of the uterus in all these cases of metritis is relaxed, and even somewhat open, the interior of the organ is easily reached, but not with the requisite freedom, unless in the presence of an anæsthetic, especially if the case be one of a patient who has not borne children, for the pain incident to proper treatment of the uterus in acute gonorrheal metritis and endometritis is generally greater than can be endured; therefore anæsthesia is necessary. The cervix should be dilated, so as to admit the smaller-sized uterine speculum, through which the canal should then be copiously irrigated with a solution of bichloride of mercury, 1 to 3,000. A quart should be run through from a fountain syringe, and then a strip of sterilized gauze (cheesecloth) should be packed into the cavity, its free end protruding into the vagina. No curetting, as a rule, is needed in these gonorrheal cases, as, in spite of the utmost care, in some operations, and most complete antisepsia, salpingitis has followed curetting. Therefore a less energetic course is recommended by eminent specialists. Careful cleansing, mild antiseptics, and thorough drainage give the best results.

At the end of twenty-four hours, or on the subsidence of the symptoms, the irrigation may be repeated and the gauze renewed, this time without an anesthesia. The open state of the internal os will easily permit this, and in subsequent treatments, creolin, owing to its lubricity, will palliate the introduction of the gauze, which drains better than bichloride; to this end, therefore, the gauze is soaked in a solution of that substance prior to the introduction. From one to three or four treatments of this kind may be needed, the symptoms and signs, as in other acute processes, being our guide.

SEPTIC ENDOMETRITIS AND METRITIS OCCURRING IN THE NON-PREGNANT UTERUS, AFTER OPERATION.

For instance, such accidents as happen from negligence on the part of the operator, proper antisepsis having been omitted. In this event, prompt and energetic measures are urgent. The cut surfaces upon the cervix should be exposed, and freely cauterized with pure carbolic acid. The internal os should be dilated, the cavity of the uterus freely irrigated with the bichloride of mercury solution,—1 to 3,000,—and the cavity of the uterus should then be packed with sterilized gauze, curettage rarely being required. The wounded surfaces above mentioned should be kept apart by sterilized gauze, and this gauze must be kept in place by the same kind of gauze packed in the vagina. If the symptoms subside, the packing in the vagina may be removed in forty-eight hours, but that in the uterus should not be disturbed for three or four days. It then should be withdrawn, if not already expelled, and the interior of the uterus need not be again entered. The vaginal douching should be commenced as soon as the gauze packing has been removed from the vaginal canal, and

kept up three times a day with carbolic acid in the douche, until the uterine packing has been removed; then the glycerine tampon may be used, as recommended for depletion. At a later period the cut surfaces may be dealt with by direct application of astringents or cauterants, or by operation, as is deemed best. In the event of a persistence of unfavorable symptoms, the course to be followed is the same as in septic inflammation following abortion, which will now be quoted from one of the leading medical text-books which has been our guide.

SEPTIC INFLAMMATIONS FOLLOWING ABORTIONS AND LABORS.

"We find ourselves in the presence of not only the gravest form of the disorder, but a very common one, so common, in fact, that it is hardly too much to say that most of these cases of uterine inflammations, met with in practise, spring from it." In fact, it is almost a daily occurrence that we meet with it. What has been said concerning its prognosis, warrants the above statement, and points also to the urgent need for early recognition and prompt treatment. Prompt action means the arrest of the terrible disorder, the speedy cure of the patient, with the preservation of her fecundity. Delayed action means the extension of the disease, which in time means a general infection of the uterus and inflammation of the adnexa, with all that such a grade of inflammation therein implies. But further than all this, delayed action means septic peritonitis or general septic infection through the lymphatics, or perhaps a pyæmis. Radical surgical measures should, therefore, be promptly applied. No time should be lost in attacking the uterus. Its cavity should be freely curetted, the sharp curette being employed, aided by a double curette or placental forceps, so that all debris may be scraped away and removed. In certain cases, where but little tenderness is present, the fingers, or if the uterus be large and flabby, two fingers instead of the curette, may be used to remove the decidual debris. The method of procedure in these cases is of sufficient importance, however, to demand something more than a passing notice. The following detailed description is therefore submitted: "As a rule, anesthesia is advisable, because thoroughness is doubtful without it, and without thoroughness failure may be expected."

We take it for granted that the patient's toilet is in readiness for the operation, and, after the patient has been anesthetized, "shave the parts, cleanse the vulva, the vagina, the cervix, and the cervical canal carefully, using for this purpose the tincture of green soap and plenty of sterilized water. For the washing of these parts employ the fingers or a soft brush, aided, if necessary, by a wad of gauze in the jaws of a pair of long-handled forceps. Now rinse with warm sterilized water. Finishing this preliminary, irrigate the cavity of the uterus freely, first dilating the internal os, if it is not already sufficiently opened to permit this. If the uterus be large, the irrigation can be conducted

suitably with only a glass tube (Chamberlain's), but if it be small, as after early abortion, some provision should be made for the return flow of the fluid as is called for in the non-pregnant uterus, the uterine speculum and metallic-nozzle tube being the preferable combination of instruments employed for this purpose. The solution to be used is bichloride of mercury,—1 to 2,000.

"Finishing this irrigation, the curettage should next be done, the fingers being introduced from time to time to make sure that all the debris has been removed. It may be possible to do this last work with the fingers alone, as has already been intimated; but the combination of the sharp curette and the fingers is useful, and, under anesthesia, easily made. To facilitate the removal of the dislodged debris from the uterine cavity, the double curette forceps or the placenta forceps is very useful. The sharp curette is to be preferred at all times to the dull, for the same reason that a sharp knife is preferable to a dull one. A minimum amount of pressure accomplishes our purpose here, if a sharp instrument is used; a maximum amount is needed with a dull instrument, and such pressure is far more likely to drive such an instrument through the softened uterine wall than the force requisite with the sharp instrument. Let the sharp curette, therefore, be used, employing a firm but light touch, checking its results by an occasional exploration with the fingers to examine nodular regions, which seem to call for the more energetic application of the instrument. A second copious irrigation with bichloride solution, above mentioned, should immediately follow curettage, the solution being 115° to 120° Fahr., if there be excessive hemorrhage. There is always free bleeding in these cases, and occasionally the blood spurts forth as if from some large vessel. But little time need be given, however, to the checking of the bleeding by this method, for the reason that the succeeding step in the treatment will do so promptly. This consists in packing the uterus fully and firmly with sterilized gauze. In a large uterus, having a well-open canal, this can be quickly done by using the curette forceps as a dresser. By means of it a long strip of the gauze, folded lengthwise half a dozen times, is passed in length by length, carefully packing it away, first in one cornu, then in the other, then at the fundus, and so on down to the external os, through which into the vagina the free end is finally brought. The vagina is then packed loosely, first around the cervix, and then down to the ostium vaginæ. If the uterus be small, as in earlier abortions, the irrigation and the packing can be best done through the uterine speculum, as in inflammation of the non-pregnant uterus, the strips of gauze in such cases being of about four thicknesses, folded to the width of the index finger, and of sufficient length to enable one piece to fill completely the uterine cavity.

"In all septic cases, one may expect a chill and a febrile reaction to follow the above treatment; but the temperature quickly falls, and the subsequent progress of the case, provided it be early attacked, is gen-

erally toward a prompt and complete recovery." The author adds that while the chill is on, hot fomentations over the heart, and a hypodermic injection of nitro-glycerine—one of Wyeth & Bros.' tablets—will cut short the chill, and add comfort to the patient; and hot-water bottles should be placed about the feet. When the chill abates, the fomentation over the heart can be removed. "The packing of the vagina should be removed at the end of twenty-four hours, a warm, cleansing douching of a saturated solution of boric acid being given twice in twenty-four hours. At the end of from forty-eight to seventy-two hours, the uterine packing may be removed in all these septic cases, and if no fever be present, the cavity of the uterus need not be again entered; but if the temperature is still elevated, then remove the packing at the end of twenty-four hours, irrigate the cavity again, and apply fresh gauze. This may be necessary.

"In certain rare cases, where the poison is of intense virulence, the condition of the patient, in spite of the above treatment, may approximate to that in which the interior of the uterus has been of too long standing or neglected, in which, therefore, general infection, with possibly a peritonitis, has supervened. One should not despair, however. The cleansing and drainage should be continued. The author uses bichloride of mercury—1 to 3,000 or 5,000—for the uterine douche, every twenty-four or forty-eight hours, according to the virulence of the case, and leaving out the gauze can get a freer drainage in cases of abortion; however, if the uterus has a tendency to contract and permit the putrid secretions to pass out, insertion of the gauze into the uterine cavity will have to be resorted to."

In the event of approaching the case for the first time after general infection or even salpingitis and peritonitis have supervened, the directions for curettage and packing already mentioned should be carried out, seemingly desperate cases not infrequently yielding to these measures.

The general measures of treatment called for in septic cases consist of mild purgatives with salines; the relief of pain by opiates; and the careful administration of easily-digested food, preferably milk and its preparations, such as koumiss and matzoon, or other forms of concentrated food, soft-boiled eggs and milk, and the free administration of stimulants, such as champagne, brandy, or whisky, aided by strychnæ. Prolonged convalescence may be expected in all severe cases which are fortunate enough to recover. This appears to be due to changes in the lymphatic system and in the blood-making glands. Malnutrition and anemia are common results, and the obstinacy with which such states are frequently maintained calls for a constant supervision as to food, tonic, and hygiene, extending in some cases over several years.

The gravest perplexity in surgery arises, however, in connection with all cases of general septic infection and peritonitis, the perplexity occurring in consequence of the possibilities of further and

more extended operation procedures. The removal of the infected uterus either through the vagina, or by coeliotomy, would offer the surest relief, could the shock of so grave an operation be controlled. But patients infected with a general sepsis rarely withstand any abdominal or even pelvic operation. If pyemia be already present, coeliotomy can offer no possible hope.

The Treatment of Chronic Endometritis and Metritis.—Commencing with the cervix, erosion of the vaginal face of an untorn cervix, depending, as such cases usually do, upon vaginitis of some kind, should be treated with a view to this fact; therefore, the vaginitis should be treated along the line already laid out. At the same time, the eroded surface should be treated with the galvanic current of electricity. The positive pole should be made to cover the erosion by moving it over the eroded surface, keeping the electrode applied from two to five minutes on each part of the diseased surface. After the galvanic seance, then apply the tincture of iodine (Churchill's). If there are any cysts, use the negative pole over the cyst instead of the positive. Give from twenty to fifty milliamperes; or what is better, attach to the negative rheorphore an electric needle (platinum preferred), place over the hypogastric region a flat electrode covered with several thicknesses of lint, puncture the cyst to the bottom, turn on from five to ten to twenty milliamperes, if necessary, till you observe that the bubbles or foam around the needle are sufficient to open the cyst. Seance from one to two minutes is usually time enough for each cyst. In some cases it may take five minutes' treatment where there is low amperage. After the cysts have been punctured with the electro-galvanic needles, then wash the cervix with a solution of boric acid, and apply Churchill's tincture of iodine. One puncture is all that is needed, if well done, to effect a cure of the cyst. The iodine may be applied every day, or every other day, until the erosion disappars.

When you do not have the galvanic battery to assist in the rapid depletion of the congested uterus, scarification, aided by the action of hot douches and tamonades of cotton wool soaked in a saturated solution of borax in glycerine or ichthyole and glycerine, will soon produce the desired result. Indurated surfaces, after scarification, should be cleansed, then painted with Churchill's tincture of iodine, or the cysts evacuated and cauterized with nitrate of silver. A daily use of the glycerine tampons, together with hot douches—115° Fahr.—need not extend over three or four weeks, especially if aided by the scarification and the local applications above mentioned. Then, if further treatment is needed, it should take the form of some one of the operative measures which belong to the domain of surgery.

Whenever possible, the integrity of the uterus should be restored, and this precaution is especially called for in the face of posterior displacements of the uterus, for without a good cervical projection into the vagina the leverage necessary to the proper action of a pessary is difficult to obtain.

In chronic inflammation of the corpus uteri, where the stage of induration has become fixed from long continuance of the infiltration, every case is stubborn, but the larger number of these can be cured, and all can be benefited by means of the galvanic current of electricity, properly applied.

The cases that respond most readily to treatment are those of subinvolution, this condition being largely an arrest of a normal process, rather than a pathological change. As a part of this state, we have the cases of the hemorrhagic form, in which decidual remnants are the focus of the endometrical change. In this latter condition we have the stage of induration, and particularly such cases as develop in connection with the menopause, or present membranous exfoliations. We also have that rare condition, super-involution. All these cases are very much prone to stubbornness. We have cases of stenosis, with flexions and versions, in which mechanical problems are presented as a part of the therapeutic question to be solved, and cases long in the stage of infiltration, in which the glandular form of endometritis predominates as a muco-purulent discharge, with perhaps a lessening of the menstrual discharge, characterizing them. Apart from these cases, we have cases associated with chronic disease of the adnexa, or peritoneal adhesions, especially where the adhesions have fixed the uterus in an abnormal position,—for instance, retroversion and latero-version. Such cases belong to the subject of salpingitis, mentioned farther on.

The appropriate treatment of a chronically inflamed uterus can only be had when we bring ourselves to that point, viewing this organ as a hollow structure, having communication with the exterior; wherein it is seen that it is amenable only through the same kind of treatment which prevails in the treatment of other cavities similarly situated.

The sooner the treatment is begun the better, because when the stage of induration is accomplished, such is the condition of the mucous membrane and walls, owing to connective tissue sclerosis, that a cure is difficult.

The most appropriate measures are cleansing the uterine cavity, removing exuberant and diseased tissue, and checking its reproduction by direct application of re-agents, aided by enforced depletion and efficient drainage; and lastly, the chemical action of the galvanic current aids wonderfully in helping the case along to a successful issue.

All this is best accomplished by irrigation, by curettage, by direct use of iodine, or some similar re-agent, and by forcibly distending the entire cavity with sterilized gauze, bringing, for the purpose of irrigation, the ends of the gauze through the cervical canal into the vagina. The treatment is the same as that already treated of in conjunction with the treatment of acute metritis, but there are minor differences, rendering necessary a reconsideration of the matter in connection with chronic metritis.

Such treatment ranks with the minor pelvic operations, and should

always be so considered, and carried out with as much regard to asepsis and cleanliness as prevails in a vaginal hysterectomy, as without this precaution a salpingitis and peritonitis may be produced. When done properly, nothing but good can come of it.

Treatment.—Curettage, caustic applications, drainage. These measures demand anesthesia.

The bowels should be thoroughly moved the day before the operation with some kind of laxative. The morning of the operation, the patient should not eat any breakfast, except in some cases, where a cup of coffee early in the morning relieves headache; it should be given black, without cream or sugar.

The village physician works at a disadvantage in not having trained nurses to prepare the room antiseptically for the operation, which is very important in all minor surgery. The reader is referred to the chapter on that subject.

After the patient is well under an anesthetic, the vulva and vagina are thoroughly cleansed with green soap and warm water, as already suggested in connection with the treatment for acute disorders.

Dilation of the cervix is the next step. Some operators prefer Hank's graduated dilator of rubber; others use Steel's or Emmett's dilators. The author first uses Hank's, then Emmett's, Hank's dilator being placed in boiling water in reach of the operator. By beginning with the smallest, it is often necessary to use a sound to get the exact curve of the canal; then bend the smallest dilator to fit the curved canal, holding the uterus steady with the Volsella forceps. The rubber dilator is made to pass into the cervix, then removed, and is replaced with another, till the third smallest size has been made to enter the cervix; then dilate with Steel's or Emmett's. This is followed by the introduction of the uterine speculum, through which the cavity of the uterus is copiously flushed with a warm bichloride of mercury solution, 1 to 2,000, to the amount of one or two pints.

Curettage is the next step. This is performed with a sharp curette (Simm's), aided by Emmett's double curette forceps. The entire cavity is scraped, first with the sharp curette, the persistence and vigor with which this is done being governed by the conditions present, the hemorrhagic form calling for greater persistence and vigor than recent sub-involution and endometritis of simple stenosis, or in anti-flexion. The anterior wall, the posterior wall, the lateral sulci where these two come together, the fundus, and the recesses of the cornu are scraped in turn. Special attention should be paid to the fundus and the cornu. The double-curette forceps will aid here, using this instrument to pinch or bite off all excrescences, and using them finally to clean out all debris from the cavity as a whole. Keep the uterus fixed with a Volsella, during the time curetting is going on, so that thorough work may be done with the curette, guarding, however, against accidents, such as penetrating the wall, which has been done. The vigor with

which the curette is applied should be in proportion to the resistance offered by the tissues. After curettage is completed, reintroduce the uterine speculum, and again copiously irrigate the cavity with some warm bichloride of mercury solution of the same strength as that first employed. At the outset of the operation, the surgeon places some gauze in a bichloride of mercury solution—1 to 5000, a strip about four feet in length, folded four times, so as to present a width throughout about equal to that of the index finger, which has been prepared for the cavity. An applicator is passed into the uterus through the speculum. Catching an end upon a simi-tampon screw or with an applicator, the gauze is passed into the uterus through the speculum, length by length, packing it away, first in one cornu, then in the other, then at the fundus, then down, step by step, until the cervix is reached. To this end, the speculum is gradually withdrawn as the packing encroaches upon it. Reaching the internal os the packing ceases. The free end of the gauze is then brought out through the cervix into the vagina. The excess is now either cut off or coiled up against the cervix. The vagina is now loosely filled with large pieces of gauze, this step completing the operation. At the end of forty-eight hours, the vaginal packing is removed; the vagina is now douched twice a day, until the uterine packing is removed. This should be done on the fifth day, a final vaginal douche being then given, unless the douches be continued from time to time for cleanliness. In some cases the uterus expels the internal part as early as the second or third day, but as some of it always remains, and by so doing insures the potency of the cervix and therefore drainage, it should not be disturbed until the day specified. Seven or eight days before the menstrual period is the time of election for this operation, it being that at which the greatest amount of depletion can be secured; and as depletion is the essence of this treatment, nothing should be omitted which will insure it. The fact that menstruation may begin while the gauze is in place, constitutes no objection to the selection of this time, for the gauze will do no harm, many patients having carried it through a period without an unusual symptom in consequence.

Cases with stenosis, flexion, or version, require correction of these defects; otherwise the endometritis and metritis will be produced. The flexion is best cured by an operation, and the version may be cured by a well-fitting pessary or an operation, and the stenosis by an operation, and, as some specialists recommend, the wearing of the cervical or uterus stem, all of which may be done in conjunction with dilatation, curettage, and packing, as those measures consume very little time. The author has had very successful results in the cure of stenosis by means of the galvanic current of electricity. The positive pole is placed in the cavity of the cervix, the negative over the hypogastric region; milliamperes are given in sufficient number to get the pathological effect, the operator being the judge. Usually from thirty

to forty milliamperes will be sufficient, seance being from seven to ten minutes, once every third day, till a cure is effected. Many operators curette thoroughly the second time in cases of stenosis, then treat with Churchill's tincture of iodine, and finally pack as above mentioned, and a relapse is very improbable. However, such cases are often found very stubborn. In all cases of sub-involution and fibroid disease with a sub-mucous growth, the galvanic current of electricity will alleviate the pain and aid in the checking of the hemorrhage, with the use of hot vaginal douches, and in case of urgent bleeding, ergot and hydrastis may be employed, and rest in bed should be insisted upon.

In condition of super-involution of the uterus, when the uterus is yet soft, the faradic current of electricity is very serviceable, but when induration supervenes, the galvanic current should be given alternate days with the faradic current. The patient should be treated daily.

Dysmenorrhea is controlled by the means of both currents given simultaneously, and has proved beneficial in the author's hands. The general health should be cared for. Good food, tonics, and rest are needed; keep the bowels regular; the patient should have some kind of occupation to keep her from brooding over her condition, many patients being such sufferers from dysmenorrhea that their minds are constantly on their condition, and they talk of their expected monthlies almost continually. If the patient has some kind of pleasant occupation for the diversion of the mind, the treatments are more likely to be effective.

I will here say a word in reference to vaginal massage. In all uterine diseases it is unnecessary, and the author believes that if long continued in, it would lead to conditions similar to those produced by masturbation.

A good abdominal supporter will give comfort to many of these patients who have relaxation of the abdominal muscles.

The pelvic, lumbo-sacral, and crural pains, which are so annoying to many of these patients, and which are most pronounced toward the close of the day, are best treated by a hot sitz-bath, taken just before the patient retires. I will also add that both currents of electricity are very efficacious in the alleviation of the pain, especially the galvanic current, the positive pole being placed over the seat of pain, and the negative over the seat whence the pain seems to radiate, the operator judging the course of the nerves affected. Seance, half an hour, if necessary, till relieved. Often ten minutes over each seat of pain is sufficient length of time. Then paint over where the positive pole was placed with tincture of iodine, and put on cotton batting. As much as one hundred milliamperes may be given for the relief of pain.

Obstinate dyspepsia associated with dilatation of the stomach is best treated by "lavage" and the galvanic and faradic currents of electricity, applied on alternate days, either internally to the mucous

membrane, or externally where the patient can not admit of the stomach tube being passed into the stomach. The internal treatment gives quicker results in the author's hands. The positive pole is placed over the nape of the neck, and the reorphore from the negative post is attached to the aluminum wire, which has been passed through the stomach tube, which (the tube) has a closed end, and is interrupted on either side of the tube. Be careful that the end of the electrode is pushed past the interrupted part down to the end of the tube, which must be done before the stomach tube is passed into the stomach. Mark the exact length where the reorphore is attached, so that in case the patient should, under an excited condition, grasp the tube and pull out the wire, you can ascertain whether the wire has been removed very far; if it has, the tube will have to be removed, and the wire replaced as above described, and re-passed into the stomach, assuring the patient that there is no danger so long as the wire does not pass through the interrupted tube. The patient having drunk a tumblerful of warm water (the water is a good conductor of electricity), the current will be conducted to all parts of the stomach from the electric wire by the water. Give from ten to twenty milliamperes for catarrh of the stomach and for the dilatation. The faradic current gives quick relief in many cases, and is beneficial in all cases when properly applied. The faradic current is applied internally in the same manner as the galvanic current.

In cases of nervous dyspepsia, due to chronic endometritis, where medicaments have failed to improve the patient's condition, the positive pole of the galvanic current is placed over the epigastric region, and the negative electrode, of aluminum wire or of platinum, well insulated with rubber to nearly the end of the wire, and with a bit of absorbent cotton cleverly twisted tightly over the end of the wire, and far enough back over the rubber—thinly applied over the rubber—twisted tightly to prevent the cotton from slipping off when the wire is removed, should be dipped into a solution of boiling-hot boracic acid before it is passed into the fundus of the uterus. The electrode must be allowed to cool before introducing it into the uterus, and give from twenty to forty milliamperes, moving the electrode first to the right cornu, then to the left, next to the fundus. The seance should be about two minutes in each place, then remove the electrode down to the internal os, and give five minutes' treatment; remove the electrode, and make an application to the cervix of nitrate of silver—twenty grains to the ounce—or an application of Churchill's tincture of iodine. This treatment should be given every other day for two or three weeks, then once every third day till the patient is relieved.

Less pronounced cases of stomachic disorder call for regulation of the diet, stomachic tonics, and for regulation of the bowels. Where ordinary exercise can not be taken, general massage, aided by general faradization, will prove beneficial, and tonics, for the improvement of

the blood, bearing upon the nervous system, may be indicated; finally, freedom from the marital relation, freedom from the cares of the housewife, and a judicious employment of outdoor exercise, will render essential service wherever indicated or permissible.

A concluding word of warning touching upon sterility. No treatment can be said to be entirely successful in the diseases of a uterus still within the period of full menstruation, unless this blight be overcome. The first measure is, to let sexual relations be natural, without any removal or disturbance of the secretions deposited by the husband, because it is the natural tonic for the vaginal walls and uterus. Any one who takes measures for the removal of this procreating material, which is God's plan for the production of human life, will have to suffer bodily in consequence of the act.

The writer can say that where nature is allowed to take its natural course in sexual relations, with the galvanic current alternately with the faradic current of electricity properly applied, with subsequent curettage and packing when it is called for, and local applications of Churchill's tincture of iodine and hygienic measures of the genitals, the best results have been secured in her hands.

CHAPTER IV.

INFLAMMATIONS OF THE UTERINE APPENDAGES AND PERITONEUM.

PELVIC INFLAMMATION.

The causes of salpingitis, cophoritis, cellulitis, lymphangitis, and pelvic peritonitis, with few exceptions, spring from the uterus.

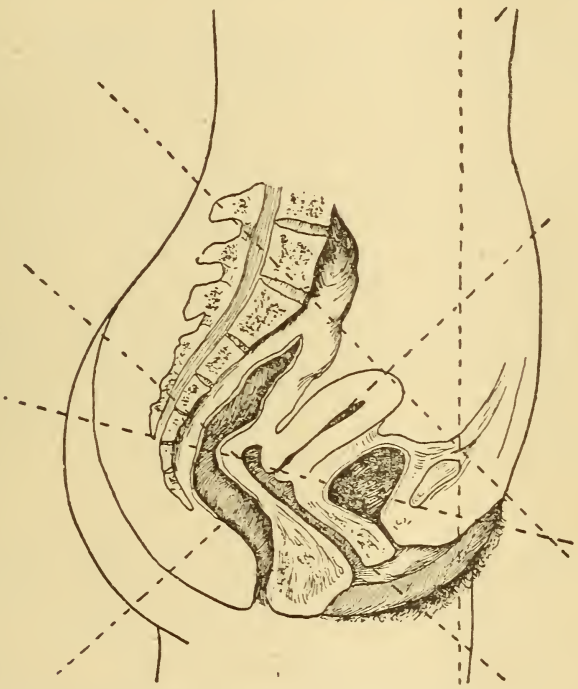
Endometritis and metritis may be said to be the causes of the above lesions.

The exceptions are found in a peritonitis developed in connection with the growth of "certain ovarian tumors," the origin of which is supposed to depend upon conditions within the ovary itself, as, for instance, hæmatomous of the ovary, dermoid cysts, and the simpler ovarian cysts; and yet the fact already noted in connection with the causation of endometritis and metritis should not be forgotten, namely, that the pressure of such growths upon the uterus sometimes provokes chronic inflammation of the organ, so that the peritonitis may not be the direct result of changes originating in the ovary, but rather from the uterus, as the source, which, more than any other, stands responsible for this lesion.

Acute suppression of menstruation is another extra-uterine cause which has been named. After all that has been said concerning the causes of the inflammations of the uterus and the endometrium, it is found that, while it is possible for any one of them to act so as to produce inflammation in the tubes, ovaries, cellular tissues, and peritoneum, yet as a fact it is the septic and specific poisons which produce these lesions most frequently.

In the non-pregnant uterus, the premenstrual period is one of the greatest susceptibility, while in the uterus recently pregnant, the first three days occupy this position. Pregnancy is responsible for a larger proportion of the inflammations involving the adnexa than any other causes combined, and of these criminal abortion ranks highest in point of infection capacity, as it generally represents the extremes of septic infection. Other causes may be added to the non-pregnant uterus in connection with any traumatism inflicted without due regard to antiseptic precaution, such as operations on the cervix, curettage, or the use of a dirty sound. The writer had one case of pelvic inflammation due to gonorrhea, which spread from the endometrium to the tubes, thence to the cellular tissues.

Dr. W. Polk says: "There can be no question as to the participation of the lymphatics and veins in the propagation of sepsis. In pyæmia, for instance, the presence of infected thrombi in distant parts proves the participation of the veins, while the presence of pus in the lymph spaces of the uterine walls, and the lymph-vessels of the broad ligaments, shows the position of the lymphatics as channels of infection. In sepsis of recently pregnant uteri, the extension to the ovaries and peritoneum is by way of the tubes, and also through the lymphatics, but



Longitudinal Sagittal Section of Woman in Rect Position, Showing the Various Axes of the Uterine and Vaginal Canal and Pelvic Brim and Vaginal Roof.

the extension most destructive to the integrity of the ovary and peritoneum is that through the tubes."

The writer had a case of inflammation of the peritoneum and cellular tissue due to tuberculosis, which is referred to in the article upon tuberculosis.

Scarlet fever, measles, and smallpox are said to be etiological factors. Whether their agency is an indirect one through the medium of the vagina and uterus, as already discussed, or a direct one, as manifested by a direct action of specific poison of a severe form of recent inflammation, the tube is enlarged, the increase reaching in some cases

to the size of the adult's middle finger, or even larger. The fimbriated end of the tube may be closed by recent exudation; if it remains open or partially open, it gives exit to the muco-purulent exudate from the cavity of the tube. Resolution, it is said, may take place in the severe forms, but the tendency is toward the chronic forms. As a rule, both tubes are attacked in the severe forms; however, it is more frequently the case that one is affected to a greater degree than the other.

In the virulent septic inflammations following labors and abortions, the process may terminate fatally too rapidly to admit of any operative measures.

The Pathology of the Chronic Forms of Salpingitis.—Both tubes are commonly involved, one to a greater extent than the other. This thickening in mainly interstitial, an inflammation of the entire thickness of the wall, an interstitial or parenchymatous salpingitis in which all the elements participate, but chiefly the connective tissue, the changes, in fact, being analogous to those met with under similar conditions in the wall of the uterus. This interstitial process is most pronounced when peritonitis is superadded, because the tube is attacked both from within and from without.

Acute exacerbations of all inflammatory processes extend to its outer as well as to its inner face. Fever is very common in all earlier phases of all cases, or most cases, of chronic salpingitis. The tube, as a whole, is much softened. Seen from the operating table, it resembles in this particular the structure of the uterus when it suffers a similar extension of the acute process to its peritoneal aspect.

PYOSALPINX.

The most common is the pus sac, or pyosalpinx. It is merely a tube, the walls of which show interstitial inflammation; the outer end is closed, and perhaps also the inner end of the tube. The closure of the outer end is the common condition, or it may be fixed against the ovary or some adjacent structure. The contraction of the inner end is the result of inflammatory adhesion of the opposed inner surfaces of the tube, this closure being most common near the cornu, but possible at any point of the narrower length of the canal. The contractions account for the retention of secretions and exudates within the tube, and the accumulation of such substances accounts for the enlargement which the ampulla of the tube undergoes. The greater enlargements occur as the result of closure of both ends of the tube; the lesser are found in conjunction with a free uterine end, the contents of the tube thus having opportunity for escape into the uterus. This escape is either a constant leakage, or like an intermittent discharge, brought on either by direct contraction of the tube, or by such pressure as may be developed in efforts, such as defecation. Direct pressure with the fingers will cause the partial evacuation of some of these pus sacs. The pus sac, or pyosalpinx, may be bi-lateral or uni-lateral.

Usually when this condition exists in one tube, salpingitis of some grade may be existing in the other tube.

The common form is a general enlargement of the tube, club-shaped at the outer end, tapering gradually towards the uterus, more or less convoluted, the conditions being due to the restraining action of what may be called the mesosalpinx, the peritoneal attachment to the broad ligament, and to its connection with the ovary.

The tube may be doubled upon itself, such constrictions being dependent upon peritoneal adhesions and bands. The greatest development is generally seen in tubes measurably free from constrictions, which assume the appearance of pear-shaped cysts, and in general attain about the size of the average normal uterus; in rare cases, such developments have been seen to attain to the dimensions of the average fœtal head.

Pus in a tube will often remain relatively quiescent for considerable periods of time, and occasionally, in common with similar collections elsewhere, may suffer partial absorption and appear ultimately as a pultaceous mass. The tendency, however, is to escape, the direction of escape being probably most often along the canal of the uterus; next, through the abdominal end of the tube, the fluid forcing its way between the agglutinated fimbræ, and also, by the combination of stretching and degeneration, an opening is made in the tube wall, through which escape of pus occurs.

The frequent discharge of the pus through the canal into the uterus, explains, in part, the fact that such cases are for a time free from dangerous symptoms. The tendency is for the tube to refill, thus alternately emptying and refilling. This condition may exist for a long time, either ending in atrophy of the tube, or by closure of the channel of escape result in a complete pus sac.

Resolution with restoration of function of such a structure is thought to be impossible, and the best that can be hoped for is some form of atrophic change. In the absence of this change, we may expect the contents of such pus sacs to escape outwards.

In developments which follow the escape of pus towards the peritoneal surface, leakage from the abdominal end of pus tubes is found to be common, each escape being accompanied and followed by the phenomena of a local peritonitis proportional to the amount and the specific virulence of the fluid. Cases originating in septic abortion or labors present the most virulent pus; those originating in gonorrheal infection rank next; and all other cases produce, as a rule, less virulent forms of pus. The presence of the streptococcus and staphylococcus mark the most virulent forms.

Hydrosalpinx is a cystic enlargement of the tube in which the general outlines and dimensions of the organ are in the main similar to those found in pyosalpinx. There are, however, radical differences. The contents are serous, not purulent, and in many cases as limpid as

water. It is said that the walls of such sacs have generally lost their original anatomical structure, connective tissue taking the place of all other. This change is the most pronounced in the mucous and muscular structures. The wall may be so thin in places as to be transparent.

It is found as a bilateral rather than as a unilateral disease, and is rarely without the association of strong, well-organized adhesions. It is free from the aggressive action characterizing pyosalpinx, tending to quiescence, though sometimes to intermittent discharge through the canal into the uterus, and finally to absorption, and general atrophy of the outer parts of the tube.

Hæmatosalpinx is the remaining cystic development in the tube. The treatment is the removal of the tubes *in toto*.

INFLAMMATION OF THE OVARIES.

ACUTE OOPHORITIS.

As a rule, both organs are involved—inflammation of the ovary. Keatings says, "While oophoritis is mainly a sequence of salpingitis, it occurs quite independently of this latter disorder." "But," says he, "whether the initial ovarian lesion begins within or without the organ, the ultimate result of the inflammation will generally be the same, because outside implications will extend to the interior, and inside will generally find its way to the exterior, the lymphatics in both instances being the route of intercommunication.

Primary Causes.—The interstitial development is, no doubt, the rule in all cases arising from acute suppression of menstruation. If the type of inflammation be purulent, pus cells will predominate. Along with all are the usual inflammatory hyperæmia and œdemia. Beginning as an interstitial process, the same element pervades the organ, the predominance of the simpler inflammatory elements upon the one hand, or those indicative of suppuration upon the other, being governed by the presence or absence of the so-called septic element in the causation.

Purulent infiltration leads to the development of abscesses, coalescence of which may convert the ovary into a complete pus sac, nothing remaining but the tunica albuginæ.

The treatment is to remove the pus sac, which comes under the head of surgery.

CHRONIC OOPHORITIS.

The common changes are atrophy and cystic degeneration. Atrophy may occur independently of outside size, and having a shriveled appearance. In the cystic form, the albuginæ is thickened, and the organ is filled with cysts intermixed with comparatively normal follicles. Some of these cysts may be so large as to occupy

nearly the whole of the ovary, and these no doubt represent the beginning of an ovarian tumor. It is said that in the absence of decided thickening of the albuginæ, these ovaries continue their function, a sufficient amount of normal tissue being present to permit this.

LYMPHANGITIS.

It is said that some implication of the lymphatics is a factor in all inflammations, and the more abundant the supply of these vessels, the more pronounced the implication. The infecting element has the most potent influence in producing the lesion. We have the simple and septic inflammation of the lymphatics. The two extremes of the inflammatory process are seen in the pregnant and the non-pregnant uterus and their appendages.

It is said that in the inflammation of the non-pregnant uterus and its appendages, it is so subordinated to the lesion which begat it, that close inspection is needed to recognize it.

In the septic inflammation of the recently pregnant uterus, we find the lymph spaces and lymph vessels of the uterus, of the appendages, and of the broad ligaments, filled with purulent fluid. The more advanced the pregnancy, and the more virulent the poison, the more pronounced are the evidences of lymphangitis. The vessels and spaces are more or less crowded with the bacteria of sepsis, this crowding being so great in the worst cases as practically to choke up these vessels. The role played by the lymphatics as channels of infection has been spoken of, and it has been shown how this is subordinate to the state of the uterus and the degree of virulence of the infecting agents. As those statements agree with the phenomena of inflammation as developed in other tissues of the body, we must conclude that a distinctly septic element must be present in order that a lymphangitis may produce a metritis, a salpingitis, an oophoritis, a cellulitis, or a peritonitis.

CELLULITIS.

Cellulitis is dependent on lymphangitis, and consequently may appear as an associate of an inflammation in any part of the genital tract. Doctor Polk is disposed to ignore the initiation of this disorder by the so-called direct extension of the infecting element to the cellular tissues, and also that through the veins, as both are subordinate to lymphatic extension occurring after these vessels have become choked with infecting elements.

Cellulitis belongs essentially to septic processes,—those in which putrefactive germs figure. The frequent presence of these agents already noted, in the inflammation of the recently pregnant uterus, and next the abundant supply of lymphatics in such uteri, readily accounts for the additional fact that cellulitis is a more common and a more

pronounced associate of the inflammation of abortion and labors, than of that developed in the non-pregnant uterus.

It consists of a serous exudate in the meshes of the connective tissue, which is accompanied by active cell-proliferation. This process may resolve, may pass into a suppurative stage, or may lead to organization of new connective tissue, with subsequent contraction, leading to shrinkage and sclerosis in the infected region. It is generally a circumscribed process. If the initiating inflammation be of virulent type, the process will be purulent from the outset; it will not be circumscribed, but will tend, on the contrary, to widespread extension, with necrosis of tissue.

CHRONIC CELLULITIS.

It has been witnessed from the operating table, by Doctor Polk and others, and also by the writer, "that it presents itself either as the organized, sclerosed, and shrunken remnant of an acute process, or as an adjunct of a similar process going on in an adjacent organ. Should the adjacent organ become purulent, and the route of evacuation be toward the area of cellulitis, this area, assuming the purulent type, will become a circumscribed abscess. This change is witnessed in conjunction with the migration of the pus from a tube, from an ovary, or from a loculus of pus encysted within the peritoneal cavity. Such abscesses are, therefore, indirect, rather than direct, formations, and are present in all cases in which pus from the source above named makes its way into the broad ligaments or through the pelvic-wall floor."

It is found that cellulitis is often dependent upon salpingitis and oophoritis, more than on metritis. Its gravest forms come from a septic metritis, as, for instance, a metritis from abortion and labors. The broad ligaments are commonly the seat of cellulitis, but as it is an accompaniment, to some degree, of inflammation wherever seated, it is to be found beneath all inflammations which rest near the connective tissue plane of the pelvis. As it is viewed from the operating table, we find it in the utero-sacral ligaments, and around and about the lower segment of the uterus. It commonly appears as a diffuse infiltration extending along the upper border of the broad ligaments, following the lines of the lymphatic vessels coming from the body of the uterus. If it forms an abscess, it attains large dimensions; otherwise, its tendency is to resolution. Its conversion into an abscess is occasionally the case, the change being a common accompaniment of puerperal septic inflammation, which usually ends fatally.

Cellulitis occurring in conjunction with lesion of the cervix and upper vagina, may lead to suppuration, as after traumatism of forced delivery; "or it may result in connective tissue increase, with subsequent organization and sclerosis, the condition extending widely through the lower areas of the pelvic connective tissue."

PERITONITIS.

Its source of infection is the cavities of the uterus, the tubes, and occasionally the ovaries.

Peritonitis is presented in three general types,—the serous, the fibrinous, and the suppurative. The serous is the simplest, and appears as a serous transudation following upon the initial infection, which is a starting-point for all. "It is said to be possible for such a transudation to be unaccompanied by any exudation or lymph, and to be free, therefore, from any associated adhesions or bands of new tissues; but, as a fact, some degree of lymph formation may be expected."

The writer has seen this exudate serum and lymph absorbed, leaving scarcely a trace, and then, on the other hand, cases have come under observation where the lymph underwent organization, presenting itself then as membranous formation, which in some places is thick, and in others filmy, forming sacs or pockets, which imprison more or less of the exudate. These accumulations of serous fluid may disappear with the subsidence of the slight inflammation provoking them, leaving the false membranes, which by subsequent contraction may become a serious hindrance to the organ to which they are attached. Then, on the other hand, it is said that "any serous exudate, through the influence of an additional inflammatory impulse, may assume the characteristics of a sero-purulent exudate, in which event its membranous incapsulation is increased in thickness and density, the combination of the two tending to the production of an encysted abscess.

"The fibrinous variety of this exudate may form a part of the serous, as already indicated. It is thought that a fibrinous exudate may be the predominating feature from the first. We find here the peritoneal surface covered to a greater or less extent with a coating of lymph, the serous exudate being a subordinate feature. The tendency of such condition is toward organization, with the creation of strong and well-formed areas of new connective tissue, which serve to bind together the opposed faces of the organs or tissues involved."

From this source we may have every affected organ bound down by adhesions, fastening the appendages in abnormal positions, and the fixation of the uterus in the position of retroversion or retroflexion, or anteversion, or in the contraction and fixation of coils of the intestines. In some cases the adhesions may be so extensive as not only to imprison the uterus and its appendages, binding them to the floor of the pelvis, but even to binding together every coil of the intestines situated below the umbilicum. Great suffering prevails from these adhesions involving the intestines, owing to interference with the movement of the bowels.

The suppurative type of peritonitis presents itself in two general forms. "It is first found in a diffuse process in which pus predominates, with more or less incompletely-formed lymph as an associate;

for instance, the condition is best seen in conjunction with the general septic peritonitis of the puerperal state."

The second form is common as an associate of pyosalpinx, and of ovarian abscess, and occasionally it occurs from suppurative cellulitis. It is incapsulated within peritoneal adhesions, and while it is generally a direct development from an exudation upon the peritoneal surface, in conjunction with a salpingitis, or an oophoritis, it is also a formation secondary to ovarian abscesses, to pyosalpinx, a ruptured extra-uterine fœtation, to a peritoneal hæmatocele, and perhaps to a cellu-pelvic abscess. It springs from a pyosalpinx, an ovarian abscess, from a suppurative inflammation of the peritoneal surface, or the same process as a sequence with intra-peritoneal extravasations of extra-uterine pregnancy or hæmatocele. "The collections of pus are to be found in the posterior and lower portions of the true pelvis, but the pelvic abscess is sometimes found wherever the inflamed end of a fallopian tube may lie; it sometimes occurs in the iliac fossa, especially in puerperal cases, and in conjunction with fibroid tumors." The writer witnessed such a case from an operating table, a short time ago, at the Waldeck Sanitarium, on Sutter Street, San Francisco. Operation performed by Dr. Thorn, Sr. Patient recovered.

The most common form of pelvic abscess is said to be derived from, and associated with, pyosalpinx. It is met with frequently in the region of the cul-de-sac and that of the lateral fossa. Its tendency is to discharge itself either into the vagina or into the rectum. It may perforate the broad ligament and discharge into the bladder. It may empty itself through the abdominal wall above Poupart's ligament. There are cases on record where they occasionally will make their way through the iliac fossa, and discharge below Poupart's ligament, upon the anterior aspect of the thigh. From what has been written concerning the action of the peritoneum in connection with these collections of pus, it is plain that its tendency is toward the constriction of a strong limited layer of adhesions around and about all such collections, no matter what their seat. In this way bad cases of pyosalpinx and ovarian abscess receive dense coats of false membrane, and all collections of pus in the pelvis are cut off from the free peritoneal cavity, it being roofed over, as it were, by the same formation of false membrane.

"In the event of sudden rupture towards the general peritoneal cavity, the phenomena of acute general peritonitis may be expected, but the extent and virulence of such a peritonitis are more dependent upon the specific characteristics of the escaping pus than upon the mere fact that it is pus. Cases of pelvic abscesses which have an antecedent history of puerperal sepsin, may be viewed as most dangerous."

Symptoms and Signs.—We shall observe the distinction between the acute, and the chronic, and the suppurative forms of the inflammation, as they are presented, and will deal with the signs and the ques-

tion of differential diagnosis. We will endeavor to note the distinctions made by different authors as we go along.

ACUTE SALPINGITIS.

In the non-septic forms, the symptoms are the same as those of endometritis, already alluded to. If we find general constitutional disturbances, pain and fulness over the arch of the pelvis, and if this increase be in the direction of the iliac region, we may look for the appendages being implicated, the temperature amounting to about 101 degrees Fahr., pulse rate 105 degrees to 110 degrees, the respiration very little changed.

Motion increases the pain, and the patient is more comfortable remaining still. This is the simplest form of salpingitis.

The above is generally found when the disease is a sequence of a single acute endometritis or metritis. In milder forms there are exceptions, where the lesions are the result of an acute suppressed menstruation. The pelvic pain is apt to be virulent from the outset, extending over the hypogastric and iliac region; pain radiates to the back and down the thighs, accompanied with a sense of fulness over the lower part of the pelvis; may be attended by constipation.

The patient can not move without greatly adding to the pain, and the pulse, temperature, and respiration are increased. The pulse may reach 110 to 120, temperature 102 degrees Fahr., respiration 26 to 28.

A sharp attack of pelvic peritonitis may accompany the menstrual flow, and this suppression, together with the cause producing it, indicates the source from which it comes. If the attack be uncomplicated by a prior endometritis or salpingitis, it may be expected to subside within a few days, but in proportion to its severity it may be a forerunner of a chronic inflammation, which may annoy the patient for many subsequent years.

The symptoms of the mild form of acute pelvic inflammation will prevail for a period varying from ten days to a month, after which, if they continue, they belong to the chronic inflammatory disorder.

The gonorrheal form of this disorder differs but little from those given above.

The acute form of the septic inflammation will differ somewhat, according to the soil upon which the poison is implanted. If it be a non-pregnant uterus upon which traumatism has been inflicted, we may have perhaps the history of such traumatism, following which we have a chill, with a sudden onset of high fever; following this, we have first hypogastric and iliac pain and fulness upon one or both sides, according as the ailment involves one or both sets of appendages. In some cases a double involvement prevails here, so that general pelvic pain sooner or later predominates. The symptoms may now subside, but if no attempt is made to strike at the root of the sepsis, they may be expected to persist and to pass within a few days into those of a well-marked attack of pelvic peritonitis, or perhaps worse, into a general peritonitis, which speedily ends in death.

The usual termination, however, is in a chronic pelvic inflammation, in which the tubes, ovaries, and peritoneum are involved to a greater or less degree. If the soil presented be that of a recently pregnant uterus, we have the antecedent history, which, if it be a natural delivery at term, will excite less suspicion than if it be an abortion. But whether it be one or the other, salpingitis and its associate inflammations are ushered in by symptoms which are akin to those just named. In most cases the symptoms of acute endometritis and metritis are so pronounced that ample warning is given; in other cases the approach of this evil is veiled i nan insidious development which demands the closest scrutiny of all puerperal cases. The initial chill and subsequent fever may be so slight as to cause but little apprehension, but pain, which may be absent over the uterus, soon appears upon one or both sides. This may be localized for several days, and if the case has a favorable tendency it may so remain. On the other hand, it may involve the entire pelvis or may spread to the general abdominal cavity, the patient in the one case presenting the phenomena of pelvic peritonitis, in the other those of general peritonitis. If it assumes this latter phase, death may be expected, but if the symptoms indicate restriction to the pelvis, they will end in those symptoms indicating chronic inflammation, passing frequently into those belonging to the development of an abscess.

In the more virulent forms of puerperal septic infection the symptoms may appear so suddenly, with such an intensity, and be so widespread as to unite metritis and general pelvic inflammation in one vivid picture. The writer witnessed one case of this kind where the temperature rose to 106 degrees after the chill began to pass off, and there was no pain complained of. The patient had given birth to a child twelve days previous. She had an interstitial growth in the wall of the uterus. The labor was normal. She, however, had had septic endometritis three years previous to the birth of this child. The patient recovered.

The case above mentioned was one of the benumbed variety of pelvic and septic inflammation. The treatment was antiseptic throughout, with saline laxatives and ice-bag applied over the abdomen; first lay two thicknesses of flannel over the hypogastric region and then the ice-bags. The action of the ice-bags must be watched, and when the temperature falls, remove them, leaving the flannel over the pelvic region. Hot vaginal douches with bichloride of mercury—1 to 3,000—were given three times in twenty-four hours; quinine, alternately with salol, was given in sufficient doses for the tonic effect of the quinine, and for the antiseptic effect of the salol; small doses of mild chloride of mercury were given in one to one-fourth-grain doses, occasionally, when the indications called for it.

Summing up the signs pertaining to acute pelvic inflammation, we find tenderness and resistance in the affected region. Pressure upon the uterus by the examination with the finger in the vagina

increases the pain; the mobility of the organ is sooner or later impaired, and with much exudate present, may finally be lost. The sense of boggy resistance at the site of the inflamed organs generally increases until ultimately a well-defined mass is appreciated. This may be only on one side of the uterus, or there may be one upon each side. The masses are usually near to the uterus, but may be in both or one iliac fossæ, filling these regions more or less completely, if within the true pelvis. The writer has seen it fill the interval between the uterus and the pelvic wall, displacing the uterus to the opposite side when single; but if double, it tends to push it forward. The forward displacement of the uterus is greatest when the mass or masses invade the cul-de-sac; and this development in the cul-de-sac is greatest when both ovaries and tubes are involved. Under such circumstances, the uterus may lie imbedded in a mass of exudate, and being pushed forward against the symphysis, the entire floor of the pelvis will present a hard surface to the examining finger. "This extreme condition of affairs, while developing within the confines of the acute stage, is an indication that the process is passing either into the chronic or into the suppurative form; for while resolution may remove the smaller masses, and cause the disappearance of a large portion of the more extended ones, yet with the latter a nucleus of indurated tissue will generally remain in and about the region of the ovary and the end of the tube, constituting a variety of the chromic forms of the ailment. And again, in place of resolution, suppuration may soon supervene, a termination by no means rare in the septic types which follow abortions and labor." (Professor Keating.)

Chronic inflammation has no special effect upon the pulse or temperature, while in the acute inflammation we find a temperature. In the chronic form, general nutrition and the nervous system are apt to suffer, so that such patients are sufferers of digestive derangement, meteorism, and constipation. Neurasthenia, malnutrition, and muscular weakness may be expected. Some patients are bedridden invalids, while others, who are constitutionally strong, will carry an amount of lesion with comparative impunity.

The special symptom of this ailment can be best presented as peculiarities of pain, of menstruation, and of leucorrhea. There is more or less pelvic pain and fulness; this feeling increases prior to the menstrual flow. The pain is more marked upon one side of the uterus, and often on both sides. Motion or any disturbance will increase the pain. A full rectum or a full bladder will add to the discomfort of the patient. The sciatic, plexus, obturator, and crural nerves, and the psoas and iliacus muscles, are said to be affected by pressure, which is represented by pain along the course of the involved nerves, and painful contraction of the implicated muscles, so that a crural neuralgia, together with pain in bending or flexing the limb on the affected side, is a common feature of an iliac deposit, and sciatic pain is the result of certain deposits in the pelvis.

In chronic pelvic inflammation, the patient is often a sufferer from dysmenorrhea; it may be irregular, occurring too frequently, or less frequent than normal; it may be excessive at any given period, and then, again, scanty.

Physical Signs.—The uterus is generally enlarged, its mobility is lessened to a greater or less degree, pressing upwards increases pain, and it is displaced from the central position.

The uterus may be retroverted or anteverted. The indurated masses is a distinctive sign of the affection. The induration may be bent upon one side, or it may fill the interval between the uterus and the pelvic wall, even encroaching upon the corresponding iliac fossa; and again it may present itself on both sides, and, finally, the posterior regions as well, the uterus being literally embedded in the mass, which, occupying the entire pelvic floor, has pushed the uterus forward against the symphysis. Tenderness upon pressure is the rule; where it is in a state of activity, the tenderness is increased. The nervous system is a factor here, because where this has developed a hyperesthesia, a comparatively small lesion may present an exaggerated tenderness; yet cases are met with, in which in spite of the presence of even widespread indurations, very little pain or tenderness is complained of.

It is not easy to account for this fact, especially as such indurations may be situated indifferently, either at the pelvic floor, or upon the wall, or be suspended upon the upper regions of the broad ligament. Percussion furnishes us some information. Dulness marks the area of the masses, of course; but if an encysted peritoneal accumulation is present, such, for instance, as a serous exudate, a lesser degree of relative dulness may extend far beyond the mere area of recognizable induration. Under these circumstances percussion becomes a valuable aid. Inspection, also, is of service in revealing the more general distention which the acute exacerbation may present, or the localized distention, which may mark the chronic interference with the sigmoid, and the rectum, or even with the coils of the small intestines.

PELVIC ABSCESS.

Symptoms of Pelvic Abscess.—General symptoms are early indicators of suppuration. There is, usually, somewhat regular exacerbation of temperature, and an increase of the pulse and respiration rate. The three keeping pace, will show a daily increase in proportion to the extent and activity of the suppurative process. These daily exacerbations are seen to reach as high as 103 degrees to 105 degrees Fahr. for temperature; the pulse 100, 120, or 130; and for the respiration, 22 to 25 to 30. These figures are considered as marking an extreme case. Lower figures prevail in the less acute cases, and proper treatment may be counted upon to modify them favorably in nearly every instance, as a subsidence which reaches below 100 degrees Fahr., for the temperature, 90 for the pulse, and 20 for the respiration. There may be some

perspiration. Free sweating, however, indicates a considerable degree of septic infection, and is, therefore, a symptom of gravity. In the absence of proper treatment, these symptoms continue to prevail; appetite and digestion are seriously impaired, and the result of the combined influence of the disturbing factors is steady emaciation and loss of strength. Such patients, it is needless to say, are in great danger, for, apart from the danger of a rupture of the pus sac toward the general peritoneal cavity, and that which pertains to pyæmia, there is always before one the steady decline of vital powers incident to all forms of prolonged suppuration. A spontaneous favorable termination may possibly be reached by a discharge of the pus outward, especially if this be through the abdominal wall or through the vagina; but even here the pus sac may remain and continue to refill and discharge, perhaps through a tortuous sinus, and the evil effect of persistent absorption may exist. This has been seen to discharge by way of the intestines; in this instance fæcal gases and solid matter may enter the sac, and, keeping up the irritation, may not only aggravate the original lesions, but add to its malign influence that which pertains to the absorption of fæcal poisons. The local symptom of pelvis abscess relates to an increase of pain and fulness in the affected region, with generally some increase of vesical and, perhaps, rectal irritation. Should the abscess point in the direction of either of these organs, there will always be increased irritation within them, and should it press upon the sciatic plexus or the obturator nerve, pain in the course of these nerves may be expected. An abscess located in the iliac fossa may be expected to cause some retraction of the thighs and legs of the affected side, and it rarely fails to induce pain with the motion of the thigh, all being dependent upon the implication of the surface of the proas and iliacus muscles.

Signs of Pelvic Abscess.—As already outlined—first, by aspiration, and next, that which results from palpation, and from fluctuation. For such cases, aspiration will suffice.

Diagnosis of Pelvic Inflammation.—It is necessary to give a differential diagnosis of pelvic inflammation, under two heads. We will give the differentiation of pelvic inflammation as a whole, from conditions which it may simulate; second, the differentiations, one from the other, of the conditions which enter into it.

The following diseased states may simulate pelvic inflammation: Fæcal impaction, hæmatocele, cancer, fibroids, psoas, abscess, and appendicitis.

Faecal Impaction.—A good cathartic should precede all pelvic and abdominal examinations, which generally removes fæcal masses; and a glycerine enema—one to two tablespoonfuls of glycerine in one pint of warm water—will aid in dispelling fæcal masses. As there are cases in which this may not be quickly accomplished, or where the cathartic has not been administered, such masses are often painful; but the outline of the tumorous mass can be felt by careful pressure, and

the pressure will cause such an indentation that there is not likely to be any mistake. An exception is to be made where the impaction is a part of organic construction of the gut, where a local peritonitis may set up about the impacted mass, preventing the necessary manipulation. In such cases, anesthesia will clear this up.

HAEMATOCELE.

The history of the case is to be considered, with the appearance of the tumor, and the sudden development of hæmatocele, which is unlike anything characteristic of pelvic inflammation. Keating says: "There is little difference in the signs, for an extensive development of inflammation may give appearance and effect quite like those pertaining to hæmatocele, and that, too, no matter at what stage of the two conditions the comparison is made. Both are soft at the inception, then hard, and later both may soften again. Both are covered with peritoneal exudate, so that after all some degree of pelvic inflammation enters into every case of hæmatocele, whether it be intra or extra-peritoneal."

CANCER.

Cancer is sufficiently self-assertive to be always recognizable through some one of the channels of investigation at our command.

Cancerous tumors of the sigmoid, of the rectum, and the bladder, are all indicated by symptoms closely connected with the organs involved, so that, although in consequence of a perforating ulcerative process developed as a part of the malignant affection in any one of the situations mentioned, a localized peritonitis may occur; and although this peritonitis may lead to a considerable addition to the general area of the original tumor, yet the history of the case, together with the characteristic symptoms and signs of intestinal or vesical implication, will reveal the essential nature of the ailment.

FIBROID TUMORS.

Occasionally a fibroid uterus, small enough to remain in the true pelvis, becomes fixed therein by peritonitis, which is generally provoked by salpingitis; it is not an uncommon complication of fibroids. The appearances presented are then very similar to such as may result from a combination of ovarian abscesses or hæmatoma, with salpingitis and peritonitis, both being, perhaps, nodular, both hard, and both giving a history of recurrent attacks of peritonitis. In such conditions the uterine sound is of inestimable value, showing a marked increase in the depth of the uterine canal in case of fibroid, and little or no increase in the other. Every resource of diagnostic method should be brought to bear, if necessary, aspiration through the vagina being, beyond question, the most serviceable of all.

The mobility and outline of such structures,—as pelvic inflamma-

tory masses and uncomplicated fibroid diseases,—coupled with the revelations of the sound, are sufficient for all purposes.

PSOAS ABSCESSES.

Dr. W. Polk says: "Pelvic inflammations which implicate the psoas and iliacus muscles and the crural nerve, may occasion symptoms and signs referable to the lower limb which simulate the above conditions, but the absence of spinal symptoms and signs, and the fact that a distinct line of induration can be traced from the region of the uterus to the iliac fossa, will determine the presence of pelvic inflammation. It is only when the two conditions occur in the same patient that confusion can arise. One is then liable to fall into error, and to infer that only pelvic inflammation is present. The exaggeration of the hip symptoms and signs should create suspicion, however, and then further inquiry will not only reveal spinal symptoms and signs, but will bring out the double history."

APPENDICITIS.

It is necessary to give the anatomy of the location of the vermiform appendix, or vermiform process, as it is very variable, according to regional anatomy, by George McClellan, M. D. The vermiform appendix is usually from seven to fifteen centimeters, or from three to six inches, in length, and from five to six millimeters, or about a quarter of an inch, in diameter. It arises from the lower and posterior part of the cæcum, and terminates in a free rounded blunt end. It has a small mesentery of its own, which ties it more or less loosely to the back surface of the cæcum. It is usually directed upwards in a flexuous course toward the termination of the duodenum, but it will be found not uncommonly hanging downwards into the right iliac fossa, between the cæcum and the ilium. Dr. McClellan states that within his observation, "where this process has been involved in perityphlitis, in consequence of the lodgment of an intestinal concretion or a foreign body, and an operation was required for its relief, the position within the iliac fossa was noticed."

As to the inflammation situated within the area of the iliac fossa, if this be dependent upon the appendages, there will almost certainly be an antecedent history of some condition giving an enlarged uterus, such, for instance, as pregnancy, a fibroid uterus, a hæmatocele, a hydrocele, or pyometra, because it is said to be quite rare, aside from such conditions, for the appendages to rest upon the iliac fossa. The history of the case will show further that the exacerbations are connected with uterine disturbances, particularly with menstruation. Palpation will reveal a connecting induration between the uterus and the iliac mass, and also that the mobility of the uterus is impaired as a whole.

The symptoms of appendicitis are more acute, the exacerbations

are more pronounced, than those associated with inflammation of the appendages, and they are commonly more severe, both in their local and in their general expression.

Aspiration, as an aid to diagnosis, is apt to give negative results until suppuration occurs. Should fæcal matter be obtained, it would be conclusive as to the presence of appendicitis, but pus with simply a fæcal odor would not be conclusive, as any purulent collection near a large intestine may possess this odor.

Before turning to the differentiation of the organs which are involved in pelvic inflammation of the uterus and appendages, I will give a brief history of the causes of appendicitis, from Wood and Fitz, for the edification of our sex, because the first question I am asked from them is, "What is the cause of appendicitis?"

Etiology.—According to Dr. Toft, the vermiform appendix was found diseased in one hundred and ten cases out of three hundred post-mortem examinations, and Hawkins found a like condition in sixteen out of one hundred autopsies.

The causes of the great frequency of inflammation of the appendix which is indicated by these figures, are due both to congenital peculiarities of structure and to conditions acquired after birth. Among the former are unusual length and abnormal position of the appendix, and irregularities in the development of its mesentery, which abnormities tend to favor the accumulation of material within the canal.

The important causes acquired after birth, are adhesions due to a localized peritonitis, either proceeding from the appendix or rising elsewhere in the abdomen, in consequence of which the appendix becomes adherent, and is prevented from expelling its contents. Most important of all is the presence of fæcal concretions or foreign bodies, the former being found in about one-half, and the other in at least one-quarter of the cases. Moulded inspissated fæces, however, are found often in a normal appendix, and therefore are to be regarded rather as a favoring than as the exciting cause of the inflammation. The same is true, though to a lesser degree, of the foreign bodies, which are various, and include seeds, bristles, worms, shot, beans, pills, and gallstones.

Digestive disturbances, or a strain or jar, such as may take place in lifting, jumping, falling, or from a blow, are of etiological importance in at least one-third of the cases. Usually, however, an attack begins without any obvious exciting cause. Appendicitis occurs oftener in males than in females, and especially in healthy youths and young adults, although it has been observed in an infant of twenty months, and in a person seventy-eight years of age.

Morbid Anatomy.—The varieties of inflammation which may be found in the appendix are the catarrhal, ulcerative, and gangrenous, each of which may be circumscribed or diffuse.

The catarrhal and ulcerative forms of inflammation are acute or chronic, and end in resolution, perforation, stenosis, obliteration; while

the gangrenous variety always ends in perforation. The appearance of catarrhal appendicitis is the same as that of catarrhal inflammation elsewhere in the intestines. But the tendency of all inflammation of the appendix is so strong to a rapid extension to the sub-mucous, muscular, and peritoneal coats, that the term "infectious" has been suggested by Morris to indicate the nature of acute appendicitis.

Symptoms.—The recognition of symptoms of appendicitis is by no means so frequent as might be inferred from the observations of Toft and Hawkins, of the prevalence of the disease. It is certain that many attacks of appendicitis are so latent as to produce either no symptoms, or such slight disturbance as not to attract particular attention. The practitioner, however, is concerned with those instances in which positive symptoms are present. Such cases may be conveniently grouped under acute and chronic appendicitis.

Acute appendicitis is characterized by abdominal pain, tenderness in the right iliac fossa, elevation of temperature, circumscribed resistance, and digestive disturbance. Most important is the unexpected occurrence of the pain in a person previously well, or suffering for a day or two from slight malaise, manifested by loss of appetite, nausea, constipation, or diarrhea. Although the pain is generally unexpected, it may follow an obvious exciting cause, as an error in diet, a jar, a strain, or the action of a purgative, and is sometimes associated with a chill or chilliness. It varies in character from a sense of discomfort to one of agony, compelling the patient to make a sudden outcry. It is usually constant, though sometimes paroxysmal. At the outset it is often referred to the abdomen in general, or to the hypogastric, umbilical, epigastric, or other region, but is soon localized in the right iliac fossa.

Of greater diagnostic importance than pain, is localized tenderness, often exquisite, produced by either superficial or deep pressure. The seat of the tenderness is usually found in the iliac fossa, within a radius of two inches from the anterior-superior spine of the ilium. McBurney has observed it oftenest near the outer edge of the right muscle, on a line between the naval and the anterior-superior spine of the ilium,—McBurney's point,—with the variations, however, in the position to the appendix, the point of greatest tenderness may be found elsewhere in the right iliac fossa, or even in the umbilical or lumbar region, in the iliac fossa, in the groin, or in the pelvis.

Elevation of temperature, however slight, is a most significant symptom of appendicitis, since it indicates the inflammatory origin of the pain and tenderness. Within twenty-four hours after the onset of the pain, the temperature may be less than 100 degrees Fahr., or it may rapidly rise above this point, especially in children, and throughout mild cases of appendicitis it may not exceed 101 degrees Fahr. In general, in a typical case of appendicitis an elevation of two or three degrees is to be expected, but a subnormal temperature may be present

in the severest cases of acute appendicitis, in which general peritonitis is present from the outset. The pulse is quickened, usually, in proportion to the elevation of temperature, but is much accelerated in the grave cases, even when the temperature is low.

Resistance on palpation of the wall of the right iliac fossa is next in importance to localized tenderness and elevation of temperature. During the first twenty-four hours after the incipient pain, especially when severe, the abdomen is often flattened, even retracted, and the tense right rectus abdominis muscle resists palpation, rendering it difficult, if not impossible, to distinguish a localized tumor if present. The abdomen, however, soon becomes distended and tympanitic, and though at first only moderately swollen, it is afterwards considerably so.

The circumscribed induration in the region of the appendix soon becomes apparent, and is found usually in the "right iliac fossa, below the line extending from the anterior-superior spine of the ilium, to the navel, nearer the former, and two finger-breadths above Poupart's ligament." The position of the induration varies, however, in accordance with the difference in the position of the appendix, already mentioned. This induration is sometimes superficial, in close proximity to the anterior abdominal wall, but is more often deep-seated, and covered by the usually distended and tympanitic cæcum, or by the distended coils of the ilium. The induration may be diffused or circumscribed, and if originally diffused, tends eventually to become defined. It sometimes represents a resistant mass of the size and shape of the little finger, or is ovoid in outline. This circumscribed resistance is due to the swollen appendix, and the surrounding peritoneal exudation, upon the abundance of which depends the size of the tumor. Fluctuation becomes apparent only at a late stage in the disease, when the exudation is so increased in quantity as to lie near the anterior abdominal wall.

The respiration is but little affected. There is loss of appetite, and vomiting is a frequent occurrence at the outset, but is usually temporary, unless general peritonitis is present. Diarrhea sometimes precedes the attack, though it is generally absent, except at a late stage in protracted cases. Constipation is the rule. Increased frequency of micturition is sometimes an early symptom, but retention of urine, perhaps requiring the use of a catheter, not infrequently takes place for a while after the first twenty-four hours. The urine is high-colored, and may be albuminous. In the further progress of acute appendicitis, the tendency is toward resolution or perforation, with the resulting localized peritoneal abscess or general peritonitis. According to the experience of most physicians in large practise, the termination in resolution is frequent.

In the mild cases of appendicitis terminating in resolution, the pain soon becomes localized, and is easily relieved by hot or cold

applications, or by small doses of morphine, although occasional twinges of pain occur. The temperature is usually slightly higher at each evening observation than on the previous day, until the third or fourth day, when it drops, often suddenly, sometimes gradually, to nearly the normal point. The abdomen is only moderately distended, and there is usually but little nausea or vomiting. The localized induration in the region of the appendix shows no tendency to increase in size, and its sensitiveness rapidly diminishes.

Although the action of the bowels is arrested, and catheterization may be necessary to empty the bladder, the intestinal peristalsis and the function of the bladder are readily restored as the temperature falls. Spontaneous action of the bowels is often easily accelerated by the use of an enema.

The severe as contrasted with the mild cases of appendicitis are those in which pain requires repeated doses of an opiate for its relief, and in which the painful area increases at intervals of a few hours. There is but little fall in the morning temperature, and that of the evening is higher than on the previous day. Neither gas nor fæces escape from the rectum, and there is often retention of urine, although there may be a frequent desire to empty the bladder. The abdominal distention rapidly increases, and the region of tenderness spreads in all directions, frequently into the pelvis.

In these severer cases, which present the characteristics of a localized peritonitis, two possibilities are especially to be anticipated; the one is the circumscribing of the inflammation to the vicinity of the appendix, resulting in the formation of a sharply-defined, usually intraperitoneal abscess, and the other is the generalizing of the peritonitis.

Generalizing of the peritonitis sometimes takes place at the outset of the attack of appendicitis. The initial pain then is of extreme violence, and extends over the entire abdomen. There is often a severe chill; the temperature usually is subnormal, but the pulse is rapid and feeble; the abdomen is tense and retracted; the skin is cool, moist, and at times mottled with livid spots; the eyes often are sunken; the face pinched; the voice husky. The patient may die during this stage of collapse, but not infrequently the patient rallies temporarily; the skin becomes hot, the abdomen distended, tympanitic, and fixed during respiration, and the pain and tenderness may diminish. Persistent vomiting is likely to occur, at times of a material resembling beef-juice, and death follows in the course of two or three days. These are the fulminating cases, which offer so little hope from any form of treatment. Without any considerable change in the course of the temperature as observed in the severe cases, the pain and tenderness rapidly and progressively spread from the starting-point, and require increasing doses of opiates for relief. The pulse gradually increases in frequency, and its force weakens. There is inability to take nourishment, and vomiting is frequent, and eventually fæcaloid. With progressive

loss of strength, the patient may be comparatively comfortable, but rarely survives beyond the first week; death not infrequently takes place suddenly and unexpectedly, often when the mental condition of the patient was so steadily improving as to make the outlook appear hopeful.

Diagnosis.—A sudden attack of pain and tenderness in the right iliac fossa, associated with an elevation of temperature, however slight, in the great majority of cases is due to an attack of acute appendicitis.

The evidence is strengthened if the symptoms are present in a young man. If the pain is intense, the tenderness exquisite, the abdomen retracted, and the right rectus muscle rigid, it is probable that perforation of the appendix is present or imminent, and the appearance of a circumscribed resistance at the usual seat of the appendix, within twenty-four hours, strengthens this probability. The pain caused by disease of the appendix may be simulated by renal colic, whether due to the passage of concretions or to an acute hydronephrosis. Appendicitis is distinguished, however, from renal colic by the presence of fever, the gradual formation of a tumor, and the absence of hæmatura. Attacks of biliary colic, due to the passage of gallstones, rarely simulate the pain from appendicitis, but pain, tenderness, tumor, and fever due to acute inflammation and distention of the gall bladder, may closely resemble the symptoms of appendicitis. The pyriform shape, superficial seat, and mobility of the tumor, and the frequently associated jaundice, are absent in appendicitis. An acute attack of pelvic peritonitis, especially of tubal or ovarian origin, may be mistaken for an attack of appendicitis. The tumor of intussusception is less tender, and the frequent tenesmus and bloody stools of this affection are lacking in appendicitis. In internal strangulation from intestinal obstruction the symptoms are not sufficiently characteristic to eliminate appendicitis. The severity of the symptoms is such, in cases of doubt, as to demand medical treatment.

Prognosis.—That appendicitis is frequently recovered from under medical treatment is a fact familiar to all physicians.

According to Porter, in a collection of four hundred and forty-eight cases, the average mortality was about seventeen per cent. The death rate in ninety-five cases treated medically being nearly fourteen per cent, while of three hundred and fifty-nine acute cases operated upon, the mortality was about eighteen per cent, the average mortality of appendicitis may be stated as about fourteen per cent; the important question relates to the prognosis of the individual case. All mild cases recover under medical treatment, and the risk of surgical treatment lessens with the mildness of the symptoms. The surgical operation attended with the least mortality is that done after the patient has recovered from an acute attack. While the symptoms are those of a mild appendicitis, the individual prognosis is favorable; but they may suddenly or rapidly change, and the outlook in severe appendicitis is always uncertain.

With symptoms of apparent severity in two patients, the one will die of general peritonitis, while the other quickly recovers. "The progress of the disease needs to be watched with a knife in hand."

In mild cases of appendicitis the temperature usually falls by the third or fourth day, intestinal peristalsis is restored, pain and tenderness disappear, and recovery takes place in the course of a week or ten days. In the severe cases death from general peritonitis is especially to be feared. The prognosis as to the individual depends, therefore, upon the presence or absence of the symptoms of an extension of the peritonitis, namely, rising pulse and temperature, and increasing distention, with or without a tumor. The persistence of the temperature after the third or fourth day, and the presence of a sensitive tumor, even with a falling temperature, are indicative of a localized suppurative peritonitis, from which the pus may be absorbed, but following which, liability to recurring attacks is frequent.

CHRONIC APPENDICITIS.

In nearly one-half of the cases of acute appendicitis seen by Fitz there was more than one attack of the disease, separated by longer or shorter intervals of freedom from discomfort; and from his experience, therefore, the patient is as likely as not to have another attack. The recurrent has all the characteristics and possibilities of the original affection. The symptoms are the same, either mild or severe, and the prognosis does not materially differ, except that the more numerous the recurrences the less severe are they likely to be. If the intervals are long, perhaps months or years, each subsequent attack is regarded as a recurrent appendicitis. If the attacks are frequent, occurring at intervals of weeks or months, and in the meantime the patient is comparatively free from uncomfortable sensations in the region of the appendix, the condition represents a chronic appendicitis, with a tendency to relapse, or simply a chronic or relapsing appendicitis. It is possible for a chronic appendicitis to exist without relapse, although these usually occur, and the lesions characteristic of a chronic appendicitis may be present as a result of an acute attack, and there be no symptoms indicative of this condition.

"The disease chronic appendicitis, however, is to be recognized clinically by a series of symptoms localized in the region of the appendix. The essential feature in these symptoms is their persistence, intervals of relief being comparatively few. As Talamon has stated, chronic appendicitis is rather an infirmity than a malady menacing life, and he has given the term "appendicular colic" to the frequent attacks of temporary pain in the region of the appendix.

"The patient is in a condition of more or less pronounced invalidism. Severe or trivial disturbances of digestion produce pain and sensitiveness in the region of the appendix, compelling the patient to remain quiet for a day or two. With the pain and tenderness there may be a

slight elevation of temperature. Sometimes constipation is associated with or precedes the discomfort, and occasionally a dull, resistant mass of considerable size is to be felt in the region of the cæcum, due to the retention of fæcal matter. This combination of retained fæces, and a painful and tender appendix, is the stereocal-typhlitis of the old writers, and is evidently the result of a mild attack of appendicitis, associated with constipation. In such cases relief often follows evacuation of the bowels, perhaps from the removal of a mechanical obstruction at the mouth of the appendix. On official examination of the right iliac fossa in the interval between the attacks of pain, the enlarged appendix is often to be felt as a distinct tumor, perhaps of the size of the little finger, either directly beneath the abdominal wall or deep seated in the iliac fossa. At such times there may be even tenderness on palpation, and the patient is usually conscious of localized resistance offered. The more frequent the recurrence of the symptoms, and the shorter the interval between them, the more enfeebled the patient becomes. The patient is not infrequently prevented from continuous work; he is debarred from the pleasure and profits of travel, through fear of an attack of pain and its possibilities while at a distance from competent medical or surgical treatment. In addition to the constant uncertainty as to freedom from discomfort, there is always danger of the occurrence of an acute attack of inflammation, resulting in perforation. The patient is often irritable and nervous, and becomes self-centered and timid. Pepper has characterized this condition as one of the most troublesome of curable affections. The symptoms may be protracted over a period of years, and we are indebted to Treves for advocating the removal of the appendix when the patient has recovered from an acute attack. Cases of chronic appendicitis sometimes closely simulate those of cancer of the cæcum, for there is a condition of progressive loss of flesh and strength, failure of appetite, weakness of digestion, irregular action of the bowels, sometimes mucous discharges, and a resistant tumor, not especially tender, in the region of the cæcum. To eliminate this possible error in diagnosis, importance is to be attached to an accurate history of the beginning of the attack, and to the frequent observations of the temperature. In such cases the diagnosis may first be made by means of an exploratory laparotomy. The prognosis of chronic appendicitis, though in general favorable as to life, is always uncertain.

"*Treatment.*—The treatment of the individual case of appendicitis is almost always surrounded with great anxiety, on account of the difficulty, in fact, in many cases the impossibility, of determining in the outset of a case whether it should be looked upon as one of fecal accumulation in the cæcum, with associated inflammation of the appendix, or as one of mild catarrhal appendicitis, or whether ulceration or perforation exists.

"The methods of treatment which have their advocates are not only

various, but antagonistic, at least so far as the giving of drugs is concerned. All are in accord in inculcating absolute quiet in bed, with total abstinence at first from food other than chicken or other broths, without rice or similar material in them, followed, when the time comes, by the addition of raw eggs, or other albuminous liquid food, pure milk being avoided on account of the tendency which it has to produce curds, although when diluted with carbonic acid water it is sometimes agreeable and useful.

"The points in regard to which there are great differences of opinion are, first, as to the use of local measures; second, as to the use of opium; third, as to the employment of calomel, and of saline or other purgatives, and as to operative procedures.

"Local applications consist in the use of heat and cold, of leeches, and of blisters. So far as concerns the use of heat or cold, I believe that the sensations of the patient are the safest guide. If the continuous application of the hot-water bag gives the greatest comfort, it should be preferred; if the application of ice reduces the pain and is agreeable to the patient, it should be selected. Except in rare cases, the only objection that can be urged against the proper use of leeches is the trivial influence the leech-bites may have on any surgical procedure that afterwards becomes necessary. I do not believe that this objection has much force; it requires only a little more care thoroughly to disinfect the leech-bites than surgically to cleanse the sound skin. The effect of the leeches upon the disease varies with the character and the cause of the attack. If the attack is the outcome of ulceration or gangrene of the appendix, or if the appendix is the center of an active infective process, leeches have no influence upon the local inflammation; on the other hand, if the inflammatory action is the outcome of a typhlitis-stercoralis, and is of slow development and of comparatively little force, leeches may be very useful, especially in gaining time for the employment of salines. Blisters I do not believe to be of any value in acute appendicitis. The blistering increases the suffering of the patient, and has little or no effect upon the spread of the inflammation; it also interferes with the work of the surgeon.

The use of opium is an exceedingly important one, concerning which there has been much discussion, which, so far as I am concerned, has led to some alteration of views. I still believe that opium does good in these cases, by controlling pain and restlessness, and it also acts anti-phlogistically in some unknown way. On the other hand, there is great force in the surgical contention that opium interferes with intestinal secretion and peristalsis, and especially to mask the symptoms or to greatly enhance the difficulties of deciding the progress of the case and the time at which surgical interference should be adopted. I believe, therefore, that unless opium is called for by the presence of excessive pain, it is best to avoid its use, and that, when used, it should be given in the form of hypodermic injections of morphine.

"The difficulty surrounding the question of the administration of salines is largely one of diagnosis. If the appendicitis is connected with fæcal accumulations in the cæcum, the administration of salines until the bowels have been thoroughly emptied is strongly indicated. If on the first day of a mild appendicitis there is the sense of the presence of a tumor imparted to the fingers on palpation, salines should always be given, and in many cases their use should be combined with that of calomel. It is better to give repeated small doses than a single large dose, the large dose being much more apt to cause vomiting than a small one, also to cause distress. Magnesium citrate is probably the best of salines, on account of the pleasantness of its taste; sodium sulphate is more certain in its action; its bitterness, however, makes it more nauseating, though lemon juice with a little sugar added covers the bitterness of the salts.

"It is a significant fact that, while formerly scientific physicians utterly abandoned and condemned the use of calomel in such diseases as diphtheria, it was largely used by country practitioners, and through their influence has been forced back upon the leading members of the profession. The same class of practitioners have often affirmed to me that they have seen an appendicitis improve simultaneously with the coming of ptyalism. I regard their evidence of practical value. In the class of cases of appendicitis now under consideration, when there are no perforations, and no gangrene or hopeless septic infection, in my opinion calomel should be administered. It acts as a laxative, and also, according to my belief, as an anti-phlogistic remedy.

"At alternate half hours the patient may take an ounce to an ounce and a half of magnesium-citrate solution, and a half grain of calomel, the calomel being dropped when from seven to ten grains have been taken, even if no action of the bowels has occurred, and the saline being administered hourly, day and night, until a free passage has been obtained, or until the impossibility of doing so has been demonstrated.

"When ulceration, perforation, or gangrene is present in an appendicitis, the saline can do no good, and may readily do harm, so that they should not be exhibited. It is, however, impossible in most cases to determine positively when perforation or ulceration occurs, so that it may be considered as a rule of practise to use the saline in the beginning of an appendicitis which is not explosive in its type. If, however, the practitioner should believe that there is probably ulceration or gangrene of the appendix, the purgative should be used only if absolutely necessary to overcome demonstrable fæcal retention. The opinion of many of the best of our surgeons that the presence of fæces in the colon greatly increases the danger of the operation upon the appendix, can not properly be disregarded. In almost all cases of appendicitis enemata are valuable; if there is reason to suspect that there is ulceration or perforation, they alone must be depended upon to clean out the colon; if these complications are absent, they may be used to assist the saline laxatives.

"The most vital problem in any case of appendicitis is as to the propriety of surgical interference. Resolution after ulceration and formation of an abscess is such a rarity that the possibility of its occurring in any case should not be taken into consideration. When, therefore, there is reason to believe during an acute appendicitis that perforation or the local formation of pus has occurred, or that the appendix has become gangrenous, immediate operation should be performed. On the other hand, very frequently, perhaps in the great majority of cases, it is impossible to diagnose accurately the condition of the appendix; so that the question naturally presents itself as to what would be the result of operating upon every case, as contrasted with the results of using the expectant treatment, with selection of cases for the surgeon. There are, however, no sufficient statistics to warrant definite conclusions on these points. The opinion put forth by some surgeons, that the operation is free from danger, is, in my opinion, erroneous. The question of the skill of the operator is in appendicitis a most important one. The operation should be undertaken with the greatest sense of responsibility, and only by those who by previous training are thoroughly prepared. It should be carried out with the most absolute asepsis. It being understood that a proper surgeon is available, the following rules seem the best that can be laid down for guidance in this matter:—

"First, when the onset of the attack of pain, the tenderness, and the tympany are excessive, and the fever and pulse rapidly rising, the probabilities of an acute perforating appendicitis are such that an immediate operation should be performed; each hour lost sensibly increases the danger.

"Second, when, in a case of mild appendicitis, sixty hours of careful treatment have gone by without any distinct abatement of the symptoms, the operation should usually be performed, except in the rare cases in which masses apparently fæcal in character have been detected at the beginning of the attack in the head of the colon, away from the immediate neighborhood of the appendix.

"Third, an immediate operation should be performed when in hitherto mild cases a sudden increase in the local and general symptoms points towards the occurrence of perforation or the formation of pus, this rule being imperative if the acute symptoms are accompanied by such widespread general tenderness and marked increase in the fever and pulse rate as to indicate the coming on of a general peritonitis. In such cases minutes are important; and unless the operation can be performed before the full development of septic peritonitis, the result will almost certainly be death.

"During convalescence from appendicitis great caution should be exercised in getting the patient back to ordinary food, and laxatives must be used freely if needed. Even after recovery care should be taken to avoid indigestible food, fruits containing seeds, violent exercise,

or any exertion which will throw strain upon the abdominal muscles, and which might, by breaking up an adhesion, stir up a slumbering inflammation. The bowels should be kept perfectly soluble; if there be a remaining induration, persistent mild counter irritation, especially with iodized oil, may be used locally. No drugs except laxatives are of any avail.

"Recurrent appendicitis often gets well finally without an operation, but certainly very grave risks attend leaving the case to nature.

"At the operation the appendix should be taken out, provided it can be done without too much injury, or without such manipulations as may rupture posible adhesions, or bring about the escape of septic matter into the peritoneum. The question of removal or non-removal must be settled during the operation by the surgeon."

The writer will add to the subject of appendicitis a short article, following the above subject, which is most excellent common-sense advice to all mothers. The initials of the author are R. H. F.:—

"Recognizing the impossibility of satisfactorily determining at the outset how an attack of appendicitis is to end, but convinced that the large majority of cases recover quickly, easily, and with safety under medical treatment, it seems to me advisable to advocate such treatment as shall favor the predominant tendency of this disease to terminate in resolution.

"From this point of view the essentials are to check peristalsis above the cæcum and to relieve the pain. Repeated instances have occurred of the aggravation of the symptoms soon after the administration of laxatives by the mouth, often by an anxious mother, who attributes the abdominal pain to the presence in the intestines of indigestible food or retained fæces. All cathartics are, therefore, to be avoided until convalescence is established, and only the blandest liquid diet is to be permitted.

"If constipation has preceded the attack, or the colon is distended with gas, a rectal enema often gives relief, and does not threaten the tearing apart of delicate tissues or adhesion, whose influence is protective, or risk the perforation of a weakened appendix.

"The relief of pain is best accomplished locally by means of hot or cold applications. If these are ineffectual, morphine should be given, beneath the skin, by the mouth, or in a suppository by the rectum, in such quantities as to keep the patient comfortable. Small doses are usually sufficient for this purpose.

"If resolution is to occur, it is likely to take place by the third or fourth day; hence, when the condition of the patient permits, an operation should be delayed until this time. The surgical treatment of the acute attack is always to be avoided when possible, because it is unnecessary in the majority of cases, and is followed by the subsequent risk of a hernia. If eventually required, it is more safely employed in the absence of acute inflammatory symptoms, and there is afterwards less likelihood of hernia.

"The removal of the appendix for chronic inflammation is to be recommended in those cases in which recurrences are frequent, or the tendency to relapse is such as to produce a state of semi-invalidism."

Returning now to the inflammatory condition of the female genital organs, we remark that when an appendicitis develops in conjunction with an enlarged uterus, confusion is sometimes unavoidable, as physical examination may show a close connection between such a uterus and the inflamed area. But a careful study of symptoms will suffice to establish the intestinal, rather than the uterine, origin of the ailment.

If inflammation within the area of the true pelvis be due to the appendages, an antecedent history of uterine disease will always be present; there will be a constant relation between the exacerbations and the uterine symptoms. If the lesion be due to the abnormally-placed appendix, let it be noted that, while the latter may stretch across the entire pelvis, yet it very rarely does so, resting completely upon the right side, near the attachment of the broad ligament to the pelvic wall. The diseased organ would then be nearly always upon the same side, where it is to be distinguished from an inflammation of the right appendages. If the mass be small, palpation may enable one to detect the free tube and ovary; but if it be large, it may implicate these structures, and may encroach upon the uterus. Under such circumstances it is very difficult to arrive at a diagnosis from the physical signs, unless the thickened appendix can be traced across the pelvic brim to the connection with the cæcum in the depths of the iliac fossa. We often have to depend upon symptoms; much can be made out of the fact that the acute symptoms, and those belonging to the exacerbations of appendicitis, are more explosive than those associated with inflammation of the appendages; and they are commonly more severe, both in their local and in their general expressions. Aspiration is an aid to diagnosis after suppuration occurs. Should fæcal matter be obtained, it would be conclusive as to the presence of appendicitis; but pus with simply a fæcal odor would not be conclusive, as any purulent collection near a large intestine may possess this odor.

Referring now to the differentiation of the organs which are involved in the pelvic inflammation of the uterus and appendages, we find that in the milder grades of the affection this is comparatively easy, especially if one resorts to recto-abdominal palpation. The outline of the thickened tubes can be followed from the cornu of the uterus to its bulbous or cystic enlargement at the infundibula; its convolutions may be recognized. The outline of the ovary may be felt, encircled, as it is apt to be, by the enlarged tube. A mere enlargement of the ovary may likewise be distinguished from that of the tube, the latter being traced to its connection at the cornu, and found free from abnormal thickening. The uterus under such conditions is so free that, no matter what may be its position, its outlines can always be made out.

The distinct evidence of cellulitis consists in the development of a

mass within the upper folds of the broad ligament, in connection with abortion or labor, when by rectal palpation one is able to distinguish free ovaries and tubes. Extreme cases of pelvic inflammation rarely permit recognition of separate organs. There is such an amount of peritoneal exudate that, beyond the uterus, the outlines of individual structures are hopelessly lost; even the outlines of the uterus may be lost, but the sound will always locate this organ, from which, as a starting-point, we gain information as to the relative implication of the two sides.

The differentiation of pyosalpinx, hæmatocele, and hydrosalpinx will be aided by the copious and sudden discharge from the uterus of the fluid characteristic of each; but if this fails, and a diagnosis is deemed essential, the aspirator may be used. A small ovarian tumor might be complicated with hydrosalpinx; but the latter condition would always present the antecedent history of chronic pelvic inflammation. Should the ovarian cyst develop subsequently to the tubal disease, careful palpation might enable one to distinguish the tube, and then by ascertaining its condition, to determine the question.

Pelvic abscess is recognized by the appearance of the fever of suppuration, by a slight aggravation of the severity of the local symptoms, by increase in the size of the mass, and by fluctuation. Pus is detected by the aspirator. Whenever the aspirator is employed, the rule is to empty, so far as possible, any sac into which the needle is introduced, because if this is not done, and the sac is left tense with fluid, there may be escape through the opening made by the needle, and this might cause serious trouble.

Prognosis.—According to various writers upon this subject, the prognosis is that the milder forms of salpingitis and ovaritis, etc., tend to recovery. Whenever the thickenings remain, and fixation shows the persistence of adhesions, the disease remains. The persistence of symptoms likewise shows an unfavorable condition of affairs. The prognosis in all such cases is unfavorable from the standpoint of health and functions, but treatment may modify this prognosis, so as at least to improve health, if it does not restore the function. The appearance of peritonitis is always a grave indication, and the more acute and widespread the evidence of this condition becomes, the graver the prognosis. The same statement applies to sepsis. Whenever either of these conditions is widespread, death usually occurs, closing the scene.

The acute pelvic inflammation associated with the recently pregnant uterus, is the most serious form of inflammation. The septic inflammation of the non-pregnant uterus is the next in point of gravity; then come those dependent upon gonorrhea.

When the disease passes into the chronic form, the periods are those covered by the acute exacerbations. Any of these accessions may lead to a general peritonitis or to an abscess. Whenever an abscess

appears, the patient is exposed to the dangers of a possible rupture towards the free pertitoneal cavity, on the one hand, and those pertaining to long suppuration, on the other.

Whenever there are extensive adhesions, and these appear to be organized, the prognosis as regards recovery is very bad, but not so as regards life.

Patients may pass a fairly comfortable life, but the greater number of them are chronic sufferers. The influence of prolonged suffering is in itself a grave factor upon some constitutions; so that, although the patient may live, yet she lives at such a cost as to rob existence of much of its value. Then, too, the undermining which her constitution inevitably undergoes, makes her an easy prey to intercurrent disorders. The mild acute forms of pelvic inflammation tend to recovery; the graver forms tend to become chronic, to terminate in pelvic abscess, and are sometimes rapidly fatal. The chronic forms tend rather to life-long chronic invalidism.

Pelvic abscess is always a grave affection, because of the possibility of infection of the general peritoneal cavity, and because of the possibility of prolonged suppuration and sepsis.

It is said that sterility usually is one of the phases of this ailment, but it is not always so. It is also said,—a matter which should not be overlooked,—that it relates to the possibility of extra-uterine pregnancy. The constrictions and other deformities produced in the tubes by inflammation appear to obstruct the passages of the fecundated ovum, so that an extra-uterine development may occur. This condition must therefore be taken into consideration in any prognosis that may be given.

The prognosis may, however, be favorably modified by the proper treatment, which we are now coming to.

Treatment of Pelvic Inflammation.—We will give only medicinal treatment, and refer to such cases as will come under the head of operative procedures, which belong to gynæcological surgery. In the general treatment we will endeavor to advise our sex as to the importance of following the physician's advice in all cases of this ailment, as it is a disease that is liable to relapses, through any imprudence, and the patient is liable to pass into chronic invalidism, if death does not close the scene.

Acute pelvic inflammation requires, in the milder types of this infection, little beyond rest in bed, gentle saline catharsis, hot douches, and hot poultices over the hypogastric region. In some cases the hot poultices will have to be applied all over the abdominal region in the beginning of the onset of the affection, and a hot-water bag filled about one-third full may be laid over the poultice, over the hypogastric region. The poultice may be changed every six or eight hours, which is often enough, provided the hot-water bag is kept hot over the hypogastric region. If there is no hot-water bag at hand, the poultice should be frequently changed for fresh hot ones, both day and night, until relief from pain is secured; then the poultices may be discontinued. Bathe

all over the hypogastric and abdominal regions with liniment of spirits of turpentine and spirits of camphor, equal parts; then apply cotton batting over the affected region, and a hot-water bag on the batting over the hypogastric region. This part of the treatment should be kept up until the patient is well out of danger; and should the pain return, the hot linseed poultice will have to be applied again, as in the beginning. Gentle saline catharsis, such as citrate of magnesia, or Epsom and Rochelle salts, equal parts, should be given in small doses every one or two hours, until the bowels are gently moved. It is a good plan to give one-fourth to one-sixth of a grain of calomel, an hour apart, until four doses are taken; then wait six hours after the last dose of calomel has been taken, and give a dose of Rochelle and Epsom salts, equal parts, about a heaping teaspoonful of each, in a half tumblerful of warm water, to move off the calomel; if this does not move the bowels in four or five hours, another dose of the salts should be repeated, or an enema of warm water, about one pint with a teaspoonful of table salt added to it, is usually sufficient to move the bowels. Hot vaginal douches should be given every six or eight hours, both night and day; the temperature of the water should be 110 degrees to 115 degrees Fahr. If there is no thermometer at hand, have the water as hot as can be borne on the back of the hand, using care that the patient is not exposed to the air while the douche is being given, and avoid undue exertion in placing the bed-pan in position for the douche. If there is much pain, or if there are such shocks as belong to the acute suppression of menstruation, then opium should be given, either by the mouth, or hypodermically, or in a suppository by the rectum, about the same as that already prescribed for the milder forms of acute metritis. As soon as the acute symptoms subside, vaginal tamponade, as already described, should be used, provided the pressure does not cause pain; and in that case the ichthyole and glycerine tampon must be omitted until it can be used without discomfort.

Absolute confinement to the bed is imperative so long as the acute symptoms prevail. A nurse is needed to give the proper attention to the emptying of the bowels and bladder, which must be done in the recumbent posture. The bladder is often emptied spontaneously while the hot vaginal douches are given; it is a good plan to remind the patient to try to void the bladder while the douche is being given. Free saline catharsis is at first very beneficial; after that a daily movement of the bowels with citrate of magnesia suffices.

If the case be septic or gonorrheal, the interior of the uterus should be treated, if this has been omitted. The mischief which an early treatment of the uterine cavity would have prevented is present here; but free the uterus of debris, and then provide drainage, by means of the gauze, as already described in the treatment of endometritis and metritis, keeping constantly before the eye the probability of the development of peritonitis and sepsis, for these are the conditions that call

for operative measures. Sepsis goes hand in hand with peritonitis as much as it does with appendicitis. "Unfortunately the seat of sepsis is in one instance an organ of small moment, with no connection; whereas, in the other, its seat is in the uterus, an organ of such widespread and intricate anatomical connection that it can not be dealt with in the prompt and radical fashion found so serviceable in cases of the appendix. This being the fact, it remains a problem as to how far surgical interference should be carried in the condition before us. The more general the implication, the more hopeless is surgical interference. Therefore, the moment that symptoms and signs appear which indicate the coming of general peritonitis, or the advent of sepsis, operation should be done."

The most radical procedure permissible is the removal of the appendages; but should the state of the patient forbid this operation, or the firm fixation of the appendages involve too much shock in their removal, then one must be content with a free opening into the center and depth of the inflamed mass, and subsequent drainage. This part of the treatment of pelvic inflammation is left to gynæcological surgery, which is a specialty. However, if the patient will not submit to an operation, it remains only to support the power of the patient by food and stimulation, and to ease the pain by opium, hot fomentations, or linseed poultices. Daily catharsis with magnesia citrate, and an occasional dose of one-fourth of a grain of calomel whenever there is a brown coat on the back of the tongue, will add to the comfort of the patient. From time to time throughout the disease the patient may be rubbed with warm alcohol; and if there is very free sweating, the patient may be sponged with hot soda water. Put about a tablespoonful of bicarbonate of soda, or baking soda, into one gallon of hot water, sponge the patient under a blanket, and dry with warm towel; then rub with warm alcohol. Before commencing to give the bath, I have found it a good plan to give the patient a tablespoonful of good whisky, to prevent a chilly sensation occurring while the bath is being administered.

At times during the course of this disease perspiration becomes profuse, and a small dose of atropine, 1-200 of a grain, will correct this condition; and if there is pain, the morphine and atropine may be given by hypodermic injection. I will also add that the patient should not be allowed any company until convalescence is established.

We come now to the treatment of chronic pelvic inflammation, which varies with its duration. In the early stage of chronic pelvic inflammation, if the uterus especially be in the early stage of endometritis and metritis, this organ must receive the same treatment as that prescribed under the head of chronic endometritis and metritis, which is curetting and packing the uterus with sterilized gauze, as we have already explained. This will, in the majority of cases, cause a speedy improvement towards restoration to efficient health. The vagi-

nal tampon may be used, at intervals of two days, for a month or more. A hot vaginal douche given at bedtime is very beneficial.

If a case of chronic pelvic inflammation is of long standing, and if the uterus is in a state of induration, such as belongs to the latter stages of chronic metritis, the galvano-uterine raclage, given according to Apostoli's method, will aid in relieving the induration and softening up the adhesions, and if persevered in will save many women from having to have the appendages removed. The writer believes that, too, many young women are allowing their ovaries to be removed when by patient electro-galvanic treatment the ovaries could be saved. If the ovary contains pus, it and the associated tube should be removed. If the tube only contains pus, and the ovary is free from pus, the operator is at liberty to amputate the tube and leave the ovary. The same rule applies in cases of hydrosalpinx and hæmatosalpinx.

Cysts of the ovary can be enucleated, leaving the ovary. Adhesions do not demand the removal of the tubes and ovaries.

In all cases of sub-acute or chronic tubal disease, it is of the first importance to treat the interior of the uterus. Curetting it with a not too sharp curette, and then firmly packing it with sterilized gauze, is the best method to begin with; after two or three days remove the gauze from the uterus, and give hot douche, and then apply a tampon made of absorbent cotton or wool, dipped in ichthyol and glycerine, packing it well up around the uterus. The tampon may be removed on the second evening at bedtime, and the hot douche applied, and on the third morning another hot douche and a tampon; this treatment is thus kept up until the patient is able to recline on a couch, when the galvanic current of electricity should be applied, care being taken not to expose the patient unduly while the current is being given. We will add that usually at the end of a month after the curetting, etc., the patient should begin taking the galvanic current of electricity to aid in the absorption of the adhesion of the uterus and its appendages.

We will give in detail the method and certain rules governing the seances of galvano-electricity, which the writer has applied satisfactorily in her own work in this field.

Apostoli, of Paris, to whom must be awarded the credit of having developed this departure in therapeutics, was fortunately in a position to demonstrate his procedure, and to hold his cases before the professional eye, so that skeptics could believe, and seekers after truth could profit, by his teaching, and put into practise for themselves the various expedients which he had devised. Thus it was not long before physicians of note, anxious to seize upon whatever help could be secured for the alleviation of woman's suffering, and a more perfect restoration to health than had hitherto been possible, took the matter up, and have since persevered in its study. The time which has elapsed since its inception, and the continued interest which still attaches to it, demonstrate more fully than could any words of praise in what general esteem

this method of treatment is held. The study is full of interest, and it is to be hoped the practise may eventually be estimated at its true value, and that those who are unwilling to depart from "well-beaten paths" will be brought to accept proven truths and demonstrable facts; for it is inevitable that every new method should have its strong advocates and its detractors. It is not to be expected that gynæcologists developed in the infancy of the art, say even twenty years ago, will turn their attention with much seriousness to a new idea of this kind, certainly not to the extent of busying themselves about the details of its correct application; nor is it even to be expected that they will relinquish their old methods, even though they require months to accomplish what a few weeks will do nowadays.

I am not one of those who believe this treatment can be applied only by physicians who have made it their study for years. It will not be doubted that those of us who have been anxious to test this method of treatment have fully informed ourselves as to the nature of the remedy, its intended mode of action, and its application. Notwithstanding the importance of being familiar with quality, resistance, amperage, and the minutiæ of this subject, we may still reduce the practical application of galvanism to a few simple rules, viz., have a sufficiently powerful battery, be able to measure the force of the current, be familiar with the action of the two poles, be sure of the condition to be treated, have a correct understanding of the results to be obtained, and a just appreciation of the effects produced; further than this, a judicious selection of the appropriate case to be subjected to such treatment, and the proper choice of instruments and mode of application, will, I think, render a man or a woman competent to solve for themselves some of the questions involved, and to have an intelligent understanding of its merits and its shortcomings.

One prevailing objection of many physicians is the inconvenience connected with the adoption of this mode of treatment. It requires considerable time to get all the appliances in readiness for work; it requires special care for the patient to guard against infection; and it demands the physician's close attention in applying it. The physician may meet with some disappointments by undertaking too much, or may not do a little very well, and consequently may not get good results. Another disagreeable element is that patients will often discontinue treatment as soon as they feel improved in their general condition of health, regardless of the fact that such relief may be the first step in the process of cure. As a matter of fact, however, almost all patients feel considerable general improvement after treatment with electricity, which is undoubtedly in large part due to general stimulation. The nutrition of the body at large is greatly improved. This stimulus apparently does not result in the improvement of the nerve tone alone, thus producing the more rapid and regular evolution of nutritive processes, but seems to affect the blood and tissues themselves, causing a chemical change in their elements.

Some of the pelvic affections in which I have used electricity, either as a destructive or as a constructive agent, to arrest growth, to promote absorption, to relieve pain, to arrest hemorrhage, many times as an adjunct to other methods of treatment, are amenorrhea, stenosis, causing sterility, dysmenorrhea, menorrhagia and sub-involution, passive engorgement of the uterus (flabby uterus), endometritis, membranous-dysmenorrhea, catarrhal-salpingitis, oophoritis, parametritis and perimetritis (plastic exudations), fibroids, and malignant diseases of the cervix, such as cancer, ulceration of the cervix, and tuberculosis of the uterus.

The most definite and well-proven points regarding the polar action of a continuous current are that the positive is acid, sedative, and hæmostatic. The negative pole is alkaline, producing a hyper-sensitive condition, and increasing bleeding. Each is diametrically opposed to the other. Physicians just beginning the use of electricity will do well to keep these points in view, as success is largely dependent upon which is used for the active pole.

In 1859 Funke discovered that a sound nerve is neutral or feebly alkaline, but changed to acid on coagulation setting in or on exhausting it by prolonged mechanical or electrical stimulation. The death of the muscle is marked by a progressive acidity, and subsequent coagulation of muscular plasma. The same is true also of nerve substance as well. Then, if it is true that the death of the muscle or nerve commences when an acid condition sets in, it is also true that an inflamed or overactive condition is due to excessive alkalinity. These points have been proven, hence we insert them here without apology or explanation.

All inflammations are primarily local, due, as stated above, to excessive alkalinity of the part; not, as it is said, that the system contains an excess of alkali, but that we have an unequal distribution of probable normal alkalinity.

We quote from such excellent authority as Dr. J. Mount Bleyer, who says, "Yet all this points to one conclusion and one deduction, that animal electricity comes first; that it is the prime factor in all processes of change, of chemical action, or otherwise, within the living body; that without its stimulus of polarization no chemical action can be called into life; consequently none can go on, and tissue metamorphosis, which is life itself, must cease."

Why is it, then, when we place the positive pole over an inflamed and painful surface, that the inflammation and pain subside? Oxygen is set free at the positive pole. Oxygen, we are taught, is an acid-maker, and the part in contact with the pole being changed to a condition of activity, the temporary death of the part has commenced, or is in a state of sedation, evinced by a circumscribed anæsthesia. But what has become of the alkalinity that existed previous to the application of the positive pole? It certainly has not been neutralized by the acid-

ity of that pole, because that would necessitate an evolution of gas, which has not taken place. As it is said, alkalies are electro-positive substances, and have an affinity for the negative pole. Consequently the excess of alkali at the point of inflammation is transferred to the neighborhood of the negative pole, which immediately assumes a hypersensitive condition, proving that excessive alkalinity causes inflammation, because the part was perfectly normal before the application of the negative pole. Hence, according to the above theory, the positive pole, placed over the adhesions, is the one to promote the degeneration of adhesions, masses, and all enlargements, wherever situated. The one ideal object is to place the positive pole as nearly in contact with these as possible to bring about the desired effect. This thought is ever prominent in my mind when dealing with electro-therapeutical measures for the absorption of such lesions.

A trustworthy galvanic battery and a good milliamperes meter and a rheostat are most important for the success of these special measures adopted for the absorption of all adhesions, masses, growths, and congested conditions of the uterus and its appendages.

In all cases the electrician should use judgment in stimulating the generative organs to a proper degree to overcome suppressed or defective menstruation.

CHAPTER V.

DISPLACEMENTS OF THE UTERUS.

Definition.—By displacement of the uterus is implied a more or less permanent deviation of that organ from the position which it naturally holds in perfect health.

Under normal conditions, the uterus occupies a position between the bladder in front and the rectum behind, the general abdominal cavity above and the vagina below.

The uterus is composed of body and neck, or, in the Latin terms, corpus and cervix. The body of the uterus comprises two-thirds of the bulk of the whole organ; the neck or cervix composes the remaining third. The upper portion of the uterine body is known as the fundus, and is situated above the exit of the Fallopian tubes and round

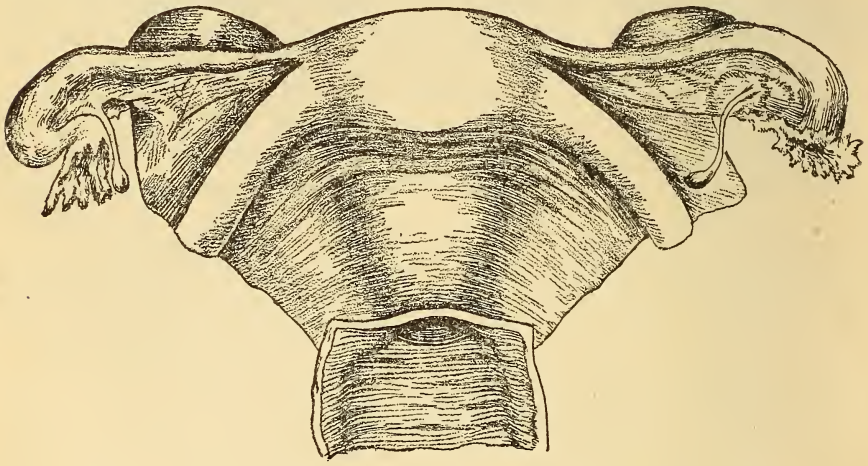


Fig. 2.—Uterus and Appendages, Front View (Beigels).

ligaments. The uterus receives its support from the utero-sacral ligaments behind, the broad ligaments on either side, the round ligaments in front, and from the connective tissue of the pelvis. As the peritoneum dips down between the organs and over the Fallopian tubes, it includes a certain amount of the cellular, or connective, tissue between its folds, which, with a few muscular fibers, form the uterine ligaments. These ligaments, with the exception of those from the uterus to the sacrum, offer but little resistance to any downward presure or prolapse, and serve only as guys to steady the organ

and to oppose a tendency to version. They are aided in this by the folds of the vagina about the cervi, and by the cervix, which acts as a pivot or lever to maintain the axis of the uterine canal in its natural relaxation to the vaginal axis. The length of the normal uterus, as measured by a sound passed into the cavity, is two and a half inches. In shape, the uterus resembles a pear. The slenderest part of the uterus is the point at which the cervix joins the body, and it is at this point that flexions of the organ most frequently occur.

Normal Position of the Uterus.—There is a diversity of opinion among authorities as to the normal position of the uterus. It is impossible to establish a point which can be accepted as its normal position in health. This difficulty arises from the fact that each woman has her own individual point, from which, however, some deviations frequently occur without being necessarily the result of

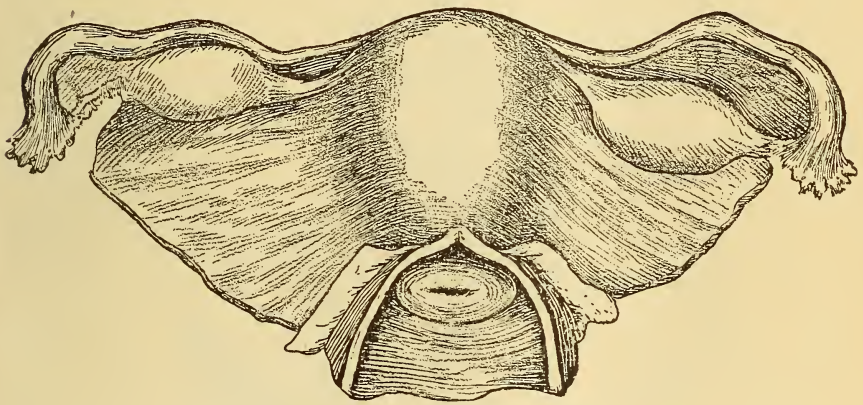


Fig. 3.—Uterus and Appendages, Rear View (Beigels).

disease. The uterus will change its position in health with every movement of the diaphragm; it will also be influenced by the condition of the bladder, by constipation, by the mode of dress, and by any temporary obstruction to the pelvic circulation. The existence of even a marked deviation is often of little moment in itself. A malposition, however, may sometimes render the woman more liable to suffer from some accidental complication, from which she might escape were the uterus in position. But until the circulation of the uterus becomes obstructed from accident, and this condition is superadded to the displacement, she may remain long in ignorance of her condition.

REMARKS ON DISPLACEMENTS.

Varieties of Displacements.—These are, first, forward,—anteversion and anteflexion; second, backward,—retroversion and retroflexion; third, sideways,—lateroversion and lateroflexion; fourth, downward,—prolapsus; and fifth, inversion.

L. of C.

As a general rule, it may be stated that anteflexions by far exceed in frequency anteversions, anteflexion being to a certain extent merely an exaggeration of the normal position of the virgin uterus, whereas anteversion is usually the result of changes following parturition. In backward displacements, retroversion, on the other hand, is by far the more frequent, it being usually found as a consequence of the increased weight of the organ and a relaxation of the ligaments following childbirth. Retroflexion, or the formation of an angle at the internal os, is commonly a secondary condition, dependent upon the downward pressure of a loaded rectum and intra-abdominal atmospheric influences. Anteflexion may therefore be said to be more fre-

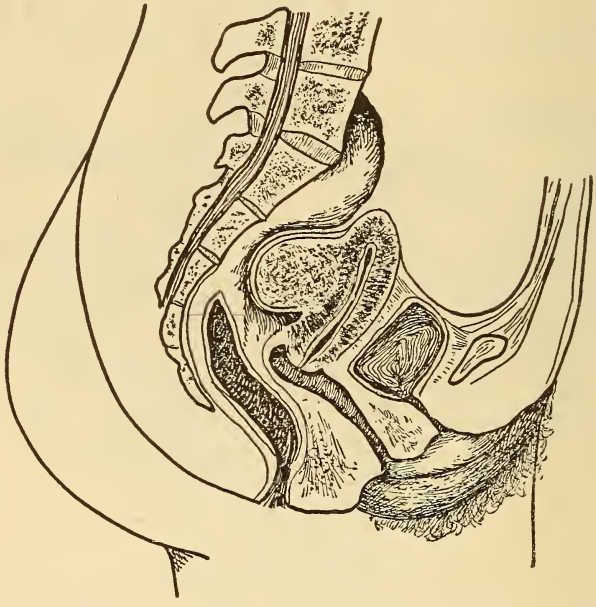


Fig. 4.—Fibroid Tumor in Posterior Wall of Uterus Simulating Retroflexion.

quent in the unmarried and in the nulliparous woman, whereas retroversion and retroflexion occur more frequently in the woman who has borne children; but that both displacements may be found under reverse condition, can not be denied. Lateroversion and lateroflexion are much less common than either of the other two mentioned varieties. Prolapsus of the uterus, in its various degrees, from a mere sagging or dropping of the organ to complete extension, occurs, with rare exceptions, in parous women, chiefly in those who have borne a large number of children. Inversion does not really belong in the category of displacements of the uterus, since it is caused by factors entirely different from those which produce the dislocations of the organ of which we have already spoken. It is mentioned as a matter of com-

pleteness, and because the organ is of course displaced—that is, turned inside out. Fortunately, this condition is not very common.

Relative Significance of Displacements.—It is conceded on general principles that anteversion is a condition of no particular significance; neither is anteflexion, unless it is of higher degrees, when it may produce either dysmenorrhea or sterility. Retroversion or retroflexion in itself may not cause any symptoms whatever; but in consequence of the interference with the circulation in the organ, the production of uterine catarrh, the frequently accompanying displacement of the ovaries and their tubes, with possible adhesions of the uterus and appendages to the adjacent peritoneum, and through interference with the caliber of the rectum, in course of time backward displacements of the uterus, if of the major degrees, usually do produce symptoms which call for relief. Prolapsus uteri, even in the minor degrees known as simple descensus, is seldom without significance, because women thus affected usually feel the dragging and dropping sensation which prevents their being long in an erect position. Lateral displacements possess a very slight significance, and are usually considered interesting on account of their tendency to produce sterility.

Causes of Displacement.—Some displacements of the uterus are congenital. Thus, new-born children have been found at post-mortem to have the uterus either sharply anteflexed or sharply retroflexed or retroverted; but these are exceptional cases. The normal antecurved position of the uterus naturally tends to facilitate the bending forward of its body from its point of attachment with the cervix, which is the weakest spot in the whole uterine anatomy. There is no question in my mind that the habits of dress which obtain among women at the present time, and which, in fact, have existed for many generations, are responsible to a very great extent for the anterior and downward displacements of the uterus, and chiefly for the anteflexions which we so frequently find in young unmarried or childless married women. The compression of the corset on the thorax, and mainly on the upper portion of the abdominal cavity, together with the pressure of the skirts upon the yielding abdominal walls,—a pressure which is by no means counterbalanced by the support the skirts are supposed to derive from the hip bones,—this pressure, I am confident, by forcing the abdominal viscera downward and forward, does, in course of time, produce many an anteflexion and moderate prolapsus. Of course if there is a tendency for the uterus to tip backward, as may have been the case from childhood, this pressure will increase the backward displacement, and the cases of retroversion and retroflexion which we find in virgins and nulliparous women are easily explained.

To understand the peculiar effect of intra-abdominal pressure faultily or excessively exerted upon the movable pelvic organs, all we have to do is to look at the accompanying diagram of a woman in the erect position. The line drawn from her vertex to the upper border

of her symphysis pubis strikes just in front of the fundus uteri. Now let the small intestines, which normally lie in front of the fundus uteri and against the anterior abdominal wall, be forced still farther down and forward by compression around the waist, and room is given for the fundus uteri to tip forward; the superincumbent intestines then press the body of the uterus still farther down, until it occupies the position believed by some to be the normal one—namely, at an angle of 35 degrees with the vagina. It only requires time and a continuance of this abnormal pressure to increase the angle of flexion at the internal os and produce a truly pathological condition.

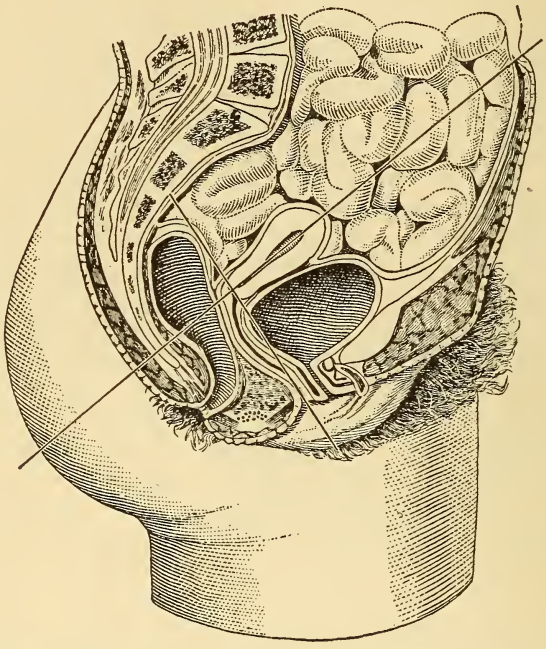


Fig. 5.—Relation of Axis of Normal Uterus to that of the Vagina.

Constipation is undoubtedly also a fruitful factor of displacements forward, backward, and downward. The full bowel resting upon the body of the uterus tends to press it downward.

Mechanical Supports.—I wish to say a few words here as to the use of mechanical supports for the displaced uterus after it has been replaced. I know there is a great deal of difference of opinion as to the value and uses of mechanical supporters, or pessaries, as they are generally called, in the treatment of uterine displacements. Some authors whose experience can not be denied, and whose opinions must be respected, utterly denounce them and never employ them. Others, again, of equal eminence and experience,

do not see how they can do without them, and use them daily. Disagreeable and in many ways obnoxious as all forms of uterine supporters undoubtedly are, it seems to me that the question is simply, in a large proportion of displacements of the uterus, notably of the backward varieties, whether we shall allow the displacement to remain untreated and the patient unrelieved or subjected to frequent and annoying manipulations, or whether, on the other hand, we shall replace the organ, keep it in position by a properly-fitting supporter, and give the patient complete relief, the only drawback being an occasional visit to the office for the purpose of supervising the case and cleansing the instrument. A woman with a badly retroverted or retroflexed uterus finds great relief from a well-fitting vaginal pessary. Not every patient who has a displacement of the uterus wishes to be operated on for its permanent cure, and for such cases I think mechanical support, by pessaries, of the replaced organ, is indispensable whenever it can be safely employed. Prolapsus, of course, does require mechanical support, but the results are by no means as satisfactory as in retro-displacements. We know that mechanical supports do not *cure* displacements. They relieve; they keep the uterus in position; they give the ligaments a chance to regain their tone. They may, in cases where the relaxation is not severe, and where the displacement is not of long standing, in the course of a few months or a year enable the ligaments and supports to become so strong that when the pessary is removed the uterus remains in its normal position. I wish to state also that there are some women who can not wear a pessary, but are made very comfortable with a well-fitting tampon made of absorbent cotton. The patient can remove these at will, and adjust another daily if necessary, by getting into the proper position (knee and chest). Her physician can easily instruct her as to the procedure. Electricity has proved a valuable aid in my hands in strengthening and giving tone to the uterus and its ligaments.

ANTEVERSION.

Definition.—Anteversion ("to turn") is a displacement of the uterus in which the fundus is turned toward the pubes, while its orifice is toward the sacrum. It may be caused by extraordinary size of the pelvis or pressure of the viscera on the uterus. Anteflexion is a simple forward inclination of the body of the uterus, without the os uteri being carried much backward.

Degrees of Anteversion.—There are accepted two degrees of anteversion,—the first in which the uterine axis is at an angle of 30 degrees with the vagina, and the second in which the uterine angle is still further lessened, until it and that of the vagina are parallel. Dr. Beigel, in his classical work on sterility, depicts a uterus anteverted to that degree. Anteversion and anteflexion may exist at the

same time, as may also anteversion and a moderate degree of prolapsus.

Causes.—The causes of anteversions of the uterus are usually increased weight of the organ, produced by subinvolution, hypertrophy, fibroid tumors of the anterior uterine wall, and pregnancy, and are generally accompanied by other factors which allow the anteverted uterus to sink down in the cavity of the pelvis, namely, relaxation of the ligaments and supports. Thus a heavy uterus with relaxed broad ligaments and flabby vaginal walls will, if not naturally inclined rather forward, have a tendency to antevert and sag into the pelvic cavity. A pendulous abdomen with increased superincumbent abdominal pressure will increase this tendency to anteversion and prolapsus.

Frequency.—In my experience, anteversion is by no means as frequent as anteflexion. Usually when I find the uterus to be anteverted, a minor degree of prolapsus (as I have already said) is associated with it. I find that whenever an anteversion produces decided symptoms, these symptoms may be attributed quite as much to the coexisting downward displacement of the uterus as to the anteversion. But rarely does the pressure on the bladder produced by an anteverted uterus alone induce the patient to consult a physician.

Symptoms.—The symptoms of anteversion have already been touched upon in the preceding remarks. The pressure on the bladder, bearing-down sensation in the erect or sitting postures, and a certain uncomfortable dragging feeling in the pelvis when walking, are the most prominent.

Diagnosis.—The diagnosis of anteversion is very easy. One has but to find the body and fundus of the uterus close to or touching the symphysis pubis, or even below it,—that is, the uterine axis parallel to the vaginal canal and the cervix pointing toward the middle or upper portion of the sacral excavation,—in order to determine the existence of an anteversion. Bimanual palpation, of course, is essential to the formation of the diagnosis, as it is to that of the majority of uterine displacements.

Complications.—Besides the almost invariable presence of prolapsus in the first degree, together with enlargement of the body of the uterus, I have only to record the presence of an interstitial or subperitoneal fibroid tumor in the anterior wall of the uterus as a not very rare complication of this displacement. Anteflexion may be present at the same time with anteversion, but will, as a rule, not materially alter the description and symptoms already given.

Treatment.—If possible, all complications should be removed. In fresh cases, the packing of the vagina with wool tampons dipped in iodoform and tannin powder (equal parts), or glycerite of tannin, the woman at the same time occupying the knee-chest position, may succeed in restoring tone to the anterior vaginal wall and the attachment of the bladder, and in thus curing the anteversion, particularly

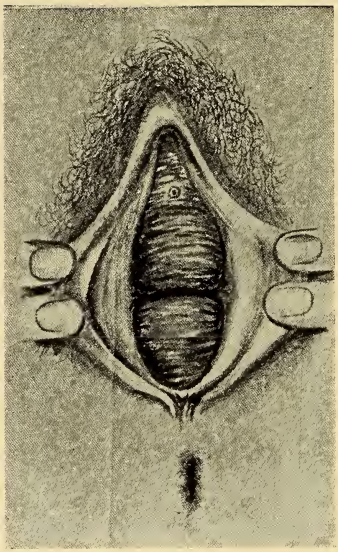


Plate a.—Cystocele and Rectocele.

if a prolapse of the anterior vaginal wall with the posterior wall of the bladder (so-called cystocele) is present at the same time. A well-fitting abdominal bandage or brace assists the vaginal tampons by pushing the abdomen upwards, thus preventing the weight of the bowel from resting so heavily upon the anteverted uterus. The patient should lie on her back to rest. The rest cure is very essential in these cases.

ANTEFLEXION.

Definition.—This is a simple forward inclination of the body of the uterus, without the os uteri being carried much backward; that

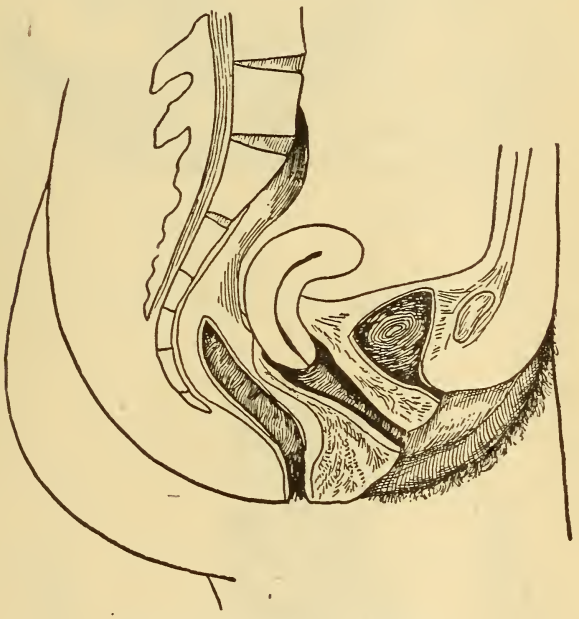


Fig. 6.—Anteflexion, First Degree.

is to say, the body of the uterus may be bent down upon the cervix, and this is called anteflexion of the body, or the cervix of the uterus may be bent upward toward the body, and this is called anteflexion of the cervix.

Causes.—As I have already stated under general remarks, an anteflexion of the uterus is but an exaggeration of the normal antecurved position of the organ. It is thought that the tendency to this exaggeration undoubtedly is congenital; that is to say, the child is born and developed with a weak spot in her uterus, and that is the junction of the body and the cervix. Either she has the anteflexion at birth or it is developed in the course of growth under the influences of dress, posture, constipation, etc., which have already been touched

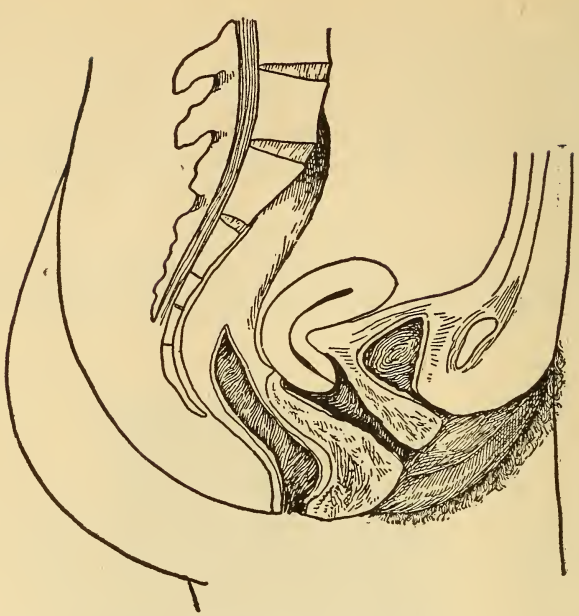


Fig. 7.—Anteflexion, Second Degree.

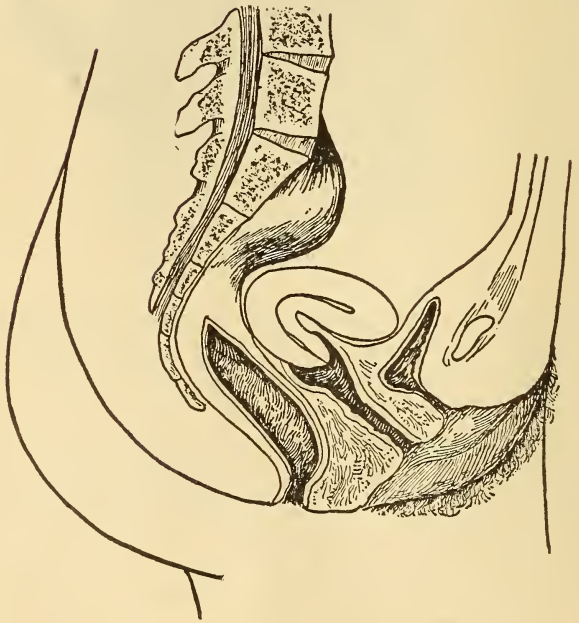


Fig. 8.—Anteflexion, Third Degree.

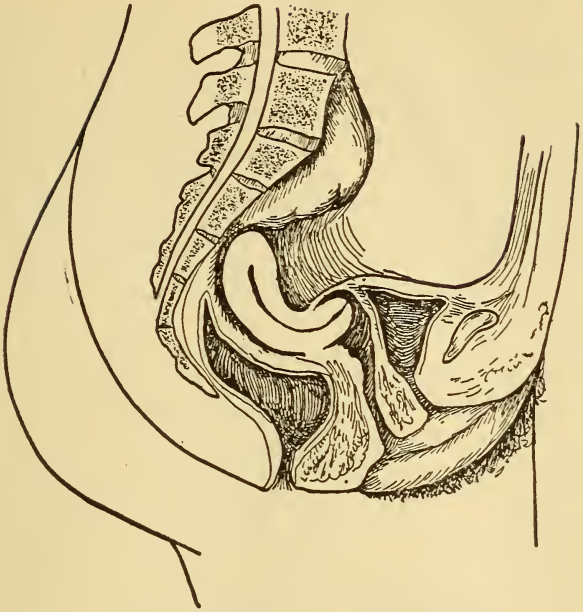


Fig. 9.—Anteflexion with Retroposition.

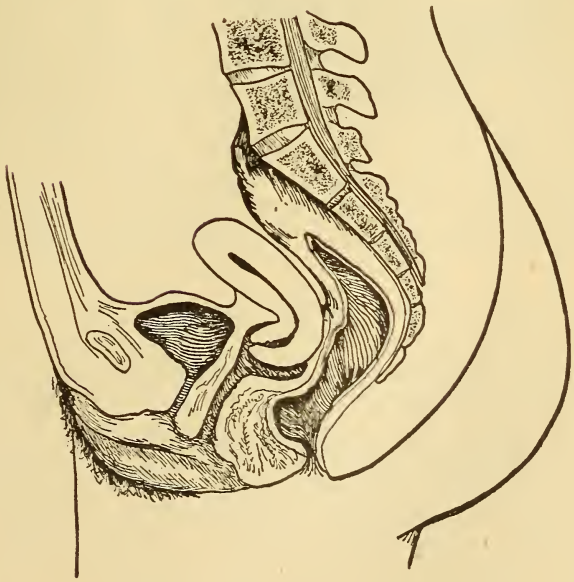


Fig. 10.—Anteflexion of the Cervix.

upon under general remarks. The one displacement of the uterus which is met with in young, unmarried, childless women with the greatest frequency is anteflexion. The causes of anteflexion may be summed up briefly to be either congenital—probably the minority—or acquired—undoubtedly the majority—but the latter depending mostly upon a congenital predisposition. A fibroid tumor, however, developing in the anterior or posterior wall of the body of the uterus may produce an anteflexion by its weight. In unmarried and sterile women anteflexion is by far the most common form of displacement.

Diagnosis.—Bimanual examination will very easily enable the physicians to make the diagnosis of the flexions in any one of the degrees mentioned. A small fibroid tumor situated in the uterine wall may simulate an anteflexion; and when that is the case, only a very careful examination, together with the use of the sound, will enable the examiner to make the diagnosis. An increase in the size of the body of the uterus will naturally contribute to a correct understanding of the case. The caliber of the external and internal orifices of the uterine canal can, of course, only be ascertained by the introduction of the uterine sound. It is distinctly understood that the differential diagnosis between a version and a flexion consists in this, that in a version the uterine canal is straight, no matter how much it may deviate from the vaginal axis, but that in a flexion there is a more or less sharp angle in the canal at a point corresponding to the internal os.

Symptoms.—Aside from dysmennorhea and sterility, an uncomplicated flexion produces no symptoms. But there are certain complications which may be present, even in the minor degrees of flexion, which do produce symptoms, and such complications are a chronic catarrh of the uterine mucous membrane, so-called chronic endometritis, and a spasmodic contraction of the circular fibers at the internal os. The first of these conditions will produce dysmenorrhea of the congestive variety; second, dysmenorrhea of the obstructive or neuralgic variety, both being possibly associated in the same case.

Treatment.—The treatment is given under the head of dysmenorrhea.

RETROVERSION.

Definition.—Retroversion is a change in the position of the uterus, so that the fundus of the organ is turned toward the concavity of the sacrum, while the neck is directed toward the symphysis pubis.

Causes.—Backward displacements of the uterus occur most frequently in women who have borne children. Its usual period of occurrence is between the third and fourth month of pregnancy, before the uterus has escaped above the superior aperture of the pelvis. A fibrous tumor in the posterior wall of the uterus may simulate a retroversion or retroflexion, if the uterus has a tendency to drop backward. Prolonged and difficult labors, lacerations of the neck of the womb,

with subsequent subinvolution of the organ,—that is to say, a more or less permanent increase in its size and weight, together with subinvolution of the suspensory ligaments of the uterus, and very often of the inferior supports, the vagina and perineum,—these are among the most common and potent factors in this displacement. It is not necessary that the perineum should be torn in order that the vagina may be relaxed and prolapsed, and thus one of the inferior supports of the uterus be removed; a mere want of involution of the perineum, that is to say, a failure of the organ to regain its normal tone and strength, is equivalent to an absolute loss of the part. If the bladder

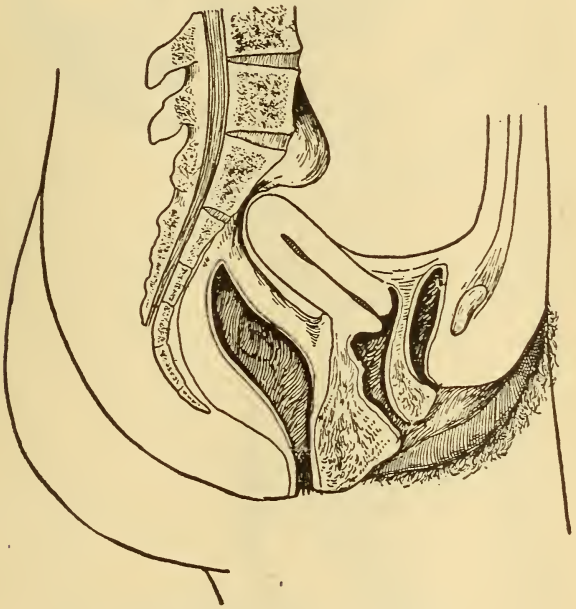


Fig. 11.—Retroversion, First Degree.

and rectum also prolapse, there is still less support for the uterus from below; and once a descent of the organ into the cavity of the pelvis having taken place, a backward tipping of its body is an almost inevitable result.

Retroversion or retroflexion is frequently found in women who have never borne children and who are even virgins. The explanation for the occurrence of the displacement in these cases must be that either the woman grew up with the displacement, in which case a congenital shortening of the utero-recto-sacral ligaments may be supposed, or else that some sudden physical shock, such as a sharp fall on the buttocks, may have caused the backward displacement.

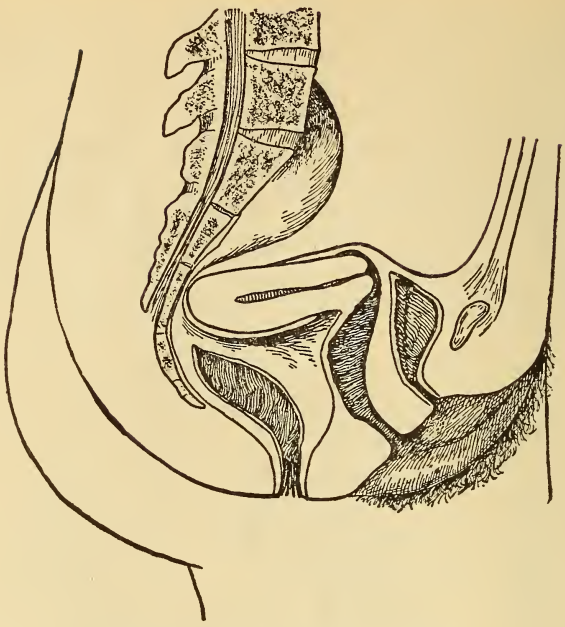


Fig. 12.—Retroversion, Second Degree.

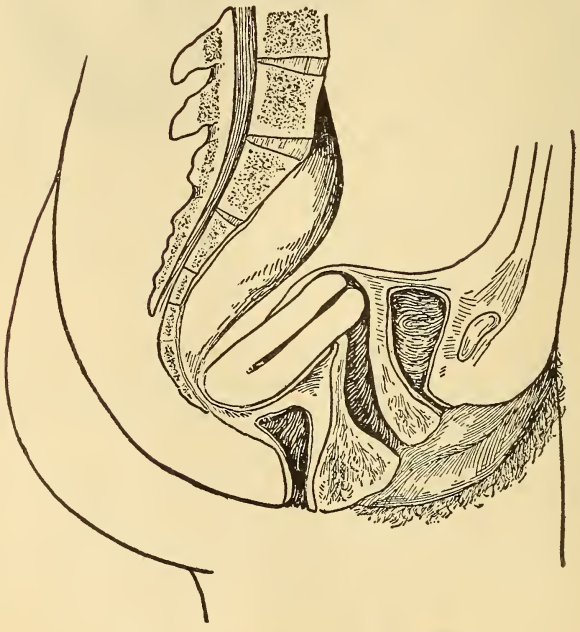


Fig. 13.—Retroversion, Third Degree.

Significance.—There is some difference of opinion as to whether a backward displacement of the uterus has in itself any particular significance in the production of local pain or reflex symptoms. If the uterus is small and movable, and the ovaries are not prolapsed with it, a backward displacement of the second or third degree, either version or flexion, may exist for years without in any way attracting the attention of the patient; but as regards this class of cases it is the exception for a uterus to be retroverted or retroflexed in the second or third degree without, in the course of time, an adhesion of the fundus, or a prolapsus and adhesion of the appendages, to occur, or a uterine catarrh to supervene, in consequence of the changes of the

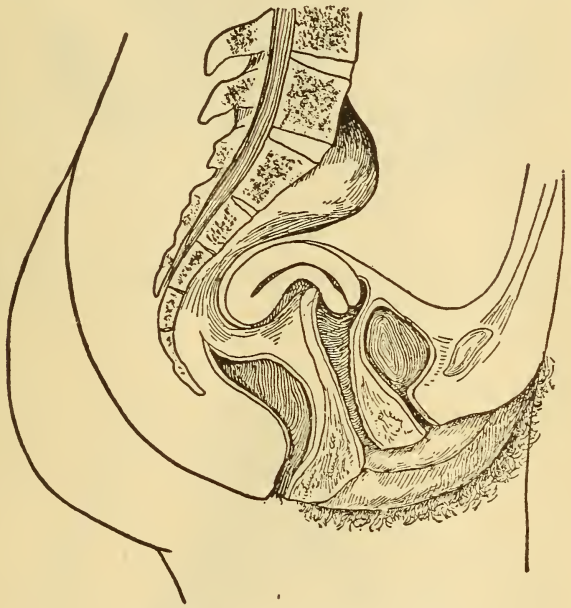


Fig. 14.—Retroflexion of the Uterus.

circulation produced by the displacement; and then inevitably come the symptoms peculiar to the aggravated forms of this displacement. It is not the displacement alone which produces pain, local and general, and the other symptoms peculiar to the displacement, but the complications produced by and naturally following the condition. Should a uterus retrovert during the first two months of pregnancy, or should a retroverted or retroflexed uterus become pregnant, as occasionally does occur, the significance of the displacement very soon becomes decidedly marked. The growing organ soon finds the pelvic cavity too limited, and, being prevented by the promontory of the sacrum from rising into the abdominal cavity, begins to rebel. Incarceration of the pregnant uterus has taken place, and uterine contractions, hemor-

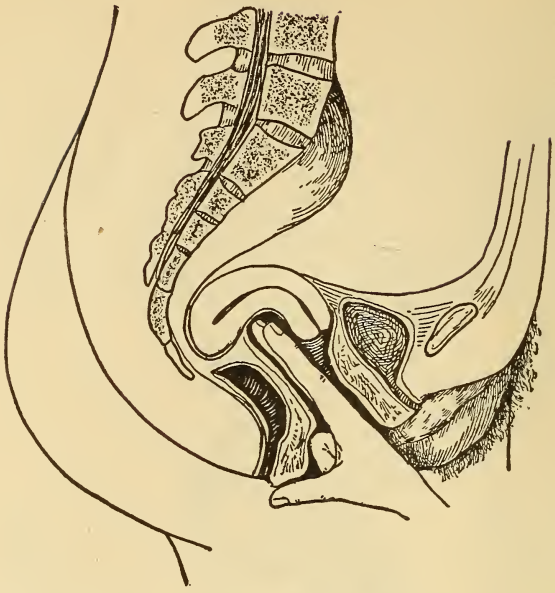


Fig. 15.—Reposition of Retroflexed Uterus in Left Lateral Position, First Step.

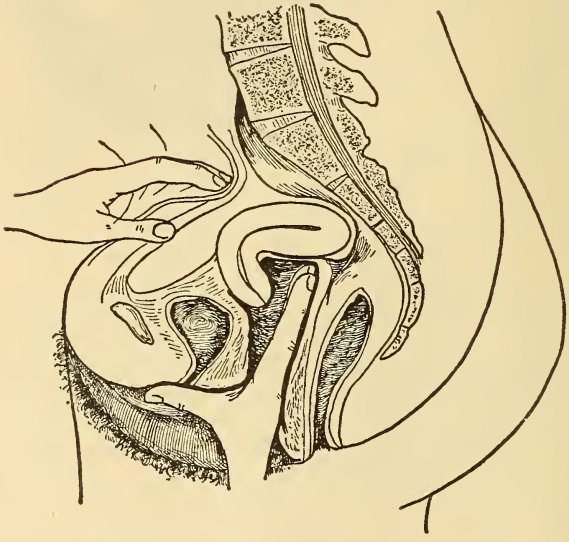


Fig. 16.—Reposition of Retroflexed Uterus in Dorsal Position.

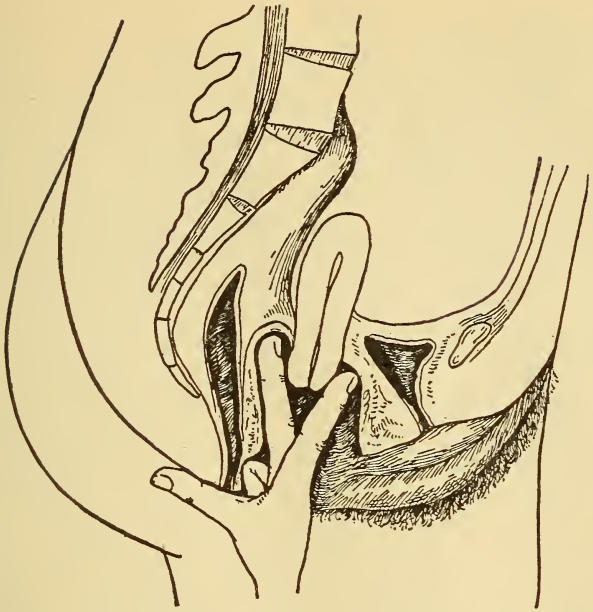


Fig. 17.—Reposition of Retroflexed Uterus in Left Lateral Position, Second Step.

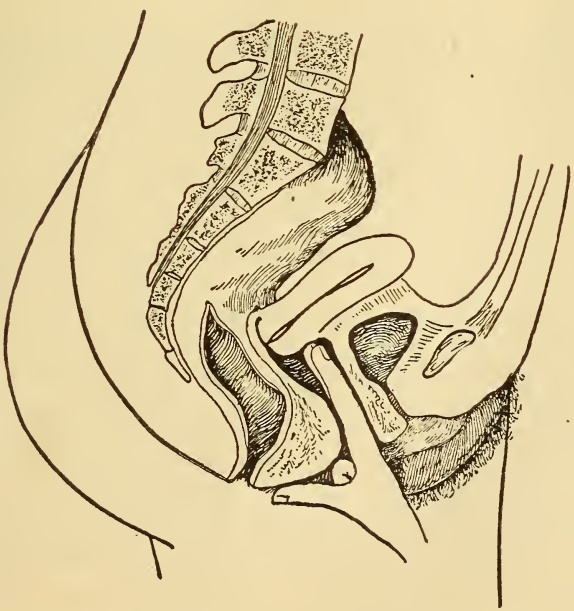


Fig. 18.—Reposition of Retroflexed Uterus in Left Lateral Position, Third Step.

rhage, and abortion are inevitable results, unless the displacement is speedily rectified and the uterus kept in place by a properly-fitting supporter. Besides the usual symptoms produced by backward displacement, sterility may be considered a very frequent result.

Symptoms.—Whenever a uterus is retroverted or retroflexed in the second or third degree, and the displacement has persisted for some months or years, the patient is likely to complain of a bearing-down, a dropping sensation in the pelvis during standing or walking, pain in the lower part of the sacrum and coccyx, perhaps extending down the back of either thigh along the sciatic nerve, an inability to walk any distance or stand for any length of time, leucorrhœa, often profuse menstruation. Besides, if the ovaries are prolapsed at the same time, there will be a more acute pain than is common in retrodisplacement alone in the region of each sacro-ischiatic notch. These are the local symptoms. The reflex symptoms are exceedingly varied and profuse, and may be classified under the heading of general neurosis of the nervous system—not neuralgia or pain, because the disturbances are not always actually painful. Thus, a woman with an aggravated retroversion or retroflexion may have hemicrania, frontal, vertical, or occipital headache, intercostal neuralgia, gastralgia, nausea, and vomiting, or may feel generally depressed and nervous, without any special localized pain. When retroversion and retroflexion do cause discomfort, they do so by pressure on the rectum or in the lower part of the back, interference with evacuation of the fæces.

Diagnosis.—The diagnosis can only be made by a vaginal examination. The body of the uterus will be found either horizontal on a line with the axis of the vagina (first degree), or tipped backwards more or less into the excavation of the sacrum, with the cervix pointing upward towards the anterior wall of the vagina in retroversion, or in the axis of the vagina, with an angle at the junction of the cervix and body, in retroflexion. The acuteness of the angle will designate the degree of flexion. Bimanual palpation will show that the body of the uterus is absent from the position which it should naturally occupy. In case of doubt, the sound or probe will verify the diagnosis of backward displacement. If the uterus is not adherent, the examining finger will be able to lift up the body of the organ, and possibly even restore it to its normal position by the aid of the other hand pressing through the abdominal wall. If the ovaries and tubes are prolapsed at the same time, they will be found lying to either side or immediately behind the body of the uterus. If the uterus is adherent or impacted between the utero-recto-sacral ligaments, it is not replaceable, and the diagnosis may become doubtful. It is necessary to remember that bimanual palpation is absolutely essential to the diagnosis of retroversion and retroflexion, as, indeed, it is to nearly all the other displacements of the uterus.

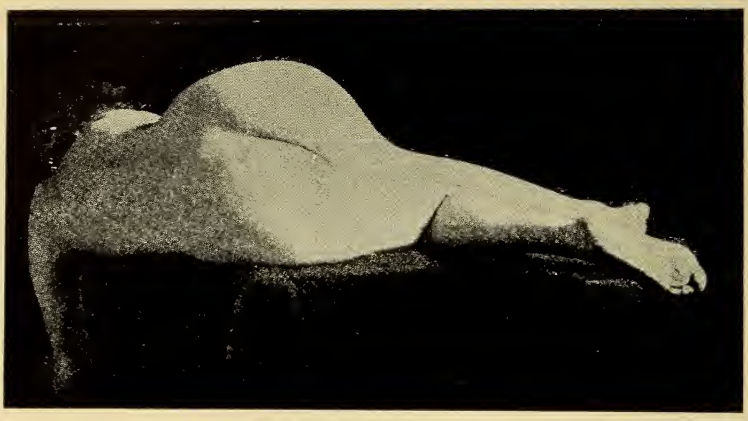


Plate b.—Sims Position. (Potter.)

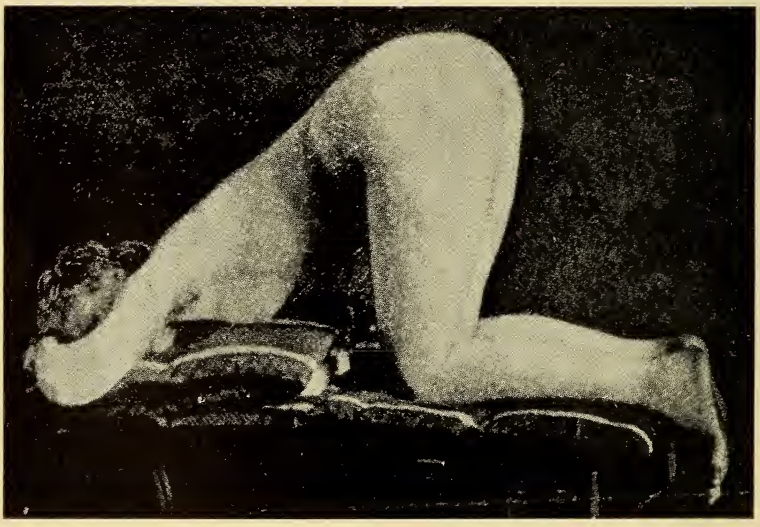


Plate c.—Knee-chest Position. (Potter.)

In making differential diagnosis, it is necessary to remember there are other bodies besides the corpus uteri which occupy Douglas' pouch and simulate a backward displacement. These are fibroids, small ovarian tumors, plastic exudations, effusions of blood, and abscesses. In such cases the sounding of the uterus may be necessary to make the diagnosis, and even then the most experienced touch may be at fault.

Treatment.—The treatment comprises simply two main points, first, the restoration of the displaced organ to its normal position, and, second, its retention therein.

First, the elevation of the retro-displaced uterus may be accomplished by the fingers, posture, and instruments (sound and repositor). In case the retroversion is due to pregnancy, it being the second, or between the third and fourth months of pregnancy, before the uterus has escaped above to the superior aperture of the pelvis, the catheter must be regularly used every eight hours, or twice in twenty-four hours, until the uterus, by its growth, rises above the pelvis. The bowels must be kept open, and absolute rest in a recumbent posture be enjoined. Should it be impracticable to draw off the urine, attempts must be made to replace the uterus. The woman being on her hands and knees, the fore and middle fingers of the accoucher's left hand are to be passed up the rectum to the fundus uteri, which they must elevate, while the cervix uteri is carefully depressed by two fingers of the right hand in the vagina. Should the fingers employed to elevate the fundus not be long enough to effect this object, a piece of whalebone may be substituted, to which a small piece of sponge is attached as a pad, or a repositor may be used. When a woman is not pregnant, the dorsal recumbent position is preferred. With one or two fingers in the vagina, the operator may elevate the uterus until the fingers of the other hand can grasp the fundus through the abdominal wall and tilt it forward. This is possible only in very thin and lax abdominal walls. The usual method of replacing a retro-displaced uterus is by putting the patient in the left latero-abdominal position (Sims'), inserting the index and middle fingers of the right hand into the vagina, and, standing well behind the patient, pressing the body of the uterus upwards until it is so far elevated that the fingers can barely touch the fundus. Then the index finger is passed in front of the cervix and draws that part backwards, while the middle finger still remains in the posterior pouch. By thus gradually drawing the cervix backward and pushing the fundus upward, the body of the uterus is slowly tipped forward into the normal anteverted position. Should this manipulation fail, the woman may be put in the knee-chest position, and with atmospheric pressure efforts made to dislodge the body of the uterus from the sacral excavation by the means of the fingers passed into the vagina, or, in extreme cases, into the rectum, or a Sims' depressor or sponge or cotton on a holder may be used as a

means of exerting pressure on the retroverted organ. At times the elevation of the perineum by a Sims' speculum, and the drawing down of the cervix by a tenaculum hooked into it, may succeed in dislodging the fundus from its impacted position in the sacral cavity, and then the pressure of air exerted with special force on the vaginal vault with the woman in this position, will aid in replacing the uterus.

The uterus having been replaced by any one of these methods, it should be at once retained in its now normal position by a properly-fitting support, or by balls of cotton or gauze packing.

Should the uterus be found unreplaceable by any of these measures, it may be safely inferred that it is adherent, and nothing short of operative interference will succeed in replacing it.

LATEROVERSION AND LATEROFLEXION.

Definition.—A uterus is said to be lateroverted or lateroflexed when its body is tipped or bent to one side or the other of the median line.

Causes.—These displacements are either congenital or acquired, in either case through a shortening of the broad ligament of the side toward which the body tips. The reasons for congenital shortening of the broad ligaments are not known; those of acquired shortening are simply the contraction following an inflammation involving the affected broad ligament.

Diagnosis.—The diagnosis is easy, being made by bimanual examination, aided, if necessary, by the sound.

Treatment.—Persistent use of tampons, so as to stretch the contracted ligaments, and the use of electricity, offer the only reasonable chances of success.

PROCIDENTIA, OR PROLAPSE, OF THE UTERUS.

Definition.—A prolapsus is a falling down of the uterus, owing to relaxation of the parts about the utero-vaginal region. This condition may exist in any degree, from a simple dragging of the organ to the entire escape of the uterus from the vagina.

Causes.—The immediate causes of prolapse are threefold,—either some growth above the uterus crowds it downward, or there is an increase of weight in the organ itself, or there is a want of proper support below. The first step in the process is usually to be traced directly to the absence of support for the vaginal walls at the outlet of the passage, from which a further descent is soon induced by the increase in weight of the organ, resulting from its malposition. To whatever cause the increase in size and weight of the uterus may be due, the organ will settle into the pelvis just in proportion to the additional burden.

Complete procedentia is essentially a condition of middle life

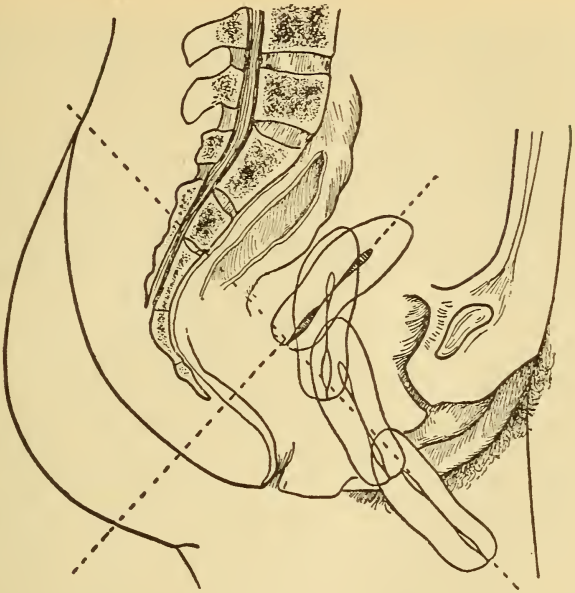


Fig. 19.—Degrees of Prolapsus Uteri (Diagrammatic). The First Shows Normal Position with Correct Uterine and Vaginal Axes.

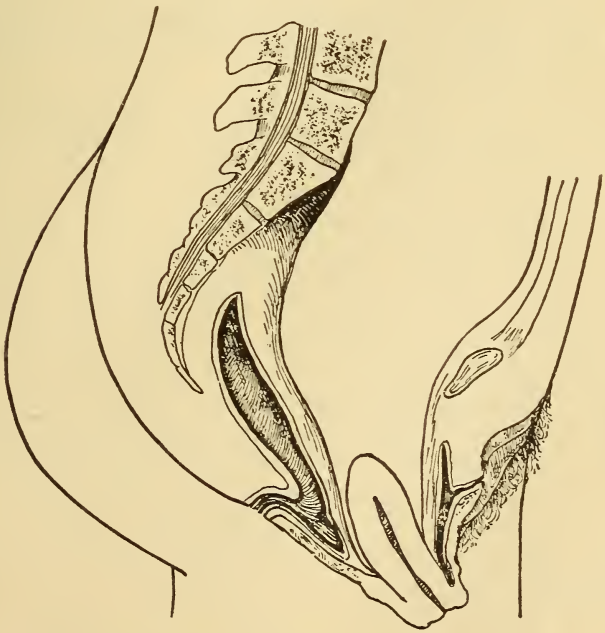


Fig. 20.—Section of Complete Prolapse of Uterus and Vagina.

or old age, and occurs usually in those who have given birth to more than the usual number of children. We have met with complete procidentia, due to fibrous polypus, in which the displacement was caused by uterine contraction.

A patulous state of the vulva must be present in every instance before the procidentia can become complete. If the pressure from above is sufficient to crowd the retroverted uterus down against the vaginal outlet, this will become gradually distended, and the neighboring tissues so thinned out from absorption as no longer to offer sufficient resistance.

The effects of childbirth are considered as the most common of all causes in producing procidentia. In all these cases the neck of the uterus becomes lacerated; and whenever this accident occurs, it will always keep up a sufficient irritation to arrest the involution or natural decrease in the size of the organ after childbirth. The increased weight of the uterus causes it to descend and rest upon the floor of the pelvis, where it acts as a wedge to keep the vagina dilated; and the cervix soon presents at the vaginal outlet. Frequently the same causes which produce laceration of the neck of the uterus will also open the vaginal outlet, and when this accident has occurred to an unusual degree, so little resistance is opposed to the descent of the uterus that the procidentia soon becomes complete.

Frequency.—Suffice it to say that prolapsus uteri in the minor degrees, associated with both anteversion and retro-displacement, is one of the most common forms of malposition of the uterus. In its second and third degrees it is also very common, being confined almost exclusively to the parous woman.

Significance.—The greater the degree of prolapsus, the greater its influence upon the comfort of the woman. Prolapsus of the first degree will probably produce but very slight discomfort, except the feeling of weight and bearing down which it entails. The inconvenience of prolapsus of the second degree is greater in proportion, and that of the third degree need merely be mentioned to be appreciated. A woman with a uterus and vagina hanging between her thighs; with the external os lacerated, eroded, bleeding, discharging; with the prolapsed vaginal walls toughened and ulcerated in places; and with the constant sensation of losing all her "insides," so to speak, is indeed in a deplorable condition. But we must not forget that, besides the uterus, the bladder and rectum are also prolapsed, and it is the bladder chiefly which gives rise to decided symptoms. The stagnation of the urine in the prolapsed portion of the bladder causes decomposition of that fluid, irritation of the vesical mucous membrane, and, in time, cystitis, which is in itself quite sufficient to render the patient miserable, irrespective of the prolapsus of the uterus and rectum. Further, accumulation of fæces in the prolapsed portion of the rectum may also give rise to more or less inconvenience.

Diagnosis.—The diagnosis of prolapsus of the uterus is exceedingly easy. It requires merely a practised finger to be enabled to determine that the cervix uteri is lower in the pelvic cavity than it should be; with a large ovoid, glistening, more or less eroded body lying outside of the vulva, a complete prolapse of the uterus and vagina is easily diagnosed. A sound passed into the uterus will verify the fact that it is the uterus which is prolapsed. Still, there may be an opportunity for error as regards the presence of a true prolapse, as the supravaginal portion of the cervix may be hypertrophied, and, having grown downwards, together with the attached anterior and posterior vaginal walls, may simulate a real prolapsus of the uterus, whereas the condition is one of hypertrophy of the cervix and prolapse of the vagina, the body of the uterus remaining about at its normal altitude in the pelvis. The sound introduced into the fundus uteri will reveal the correct diagnosis, since it will be found that two-thirds of this seemingly-prolapsed organ is cervix and only one-third body, and that the fundus retains its normal elevation in the pelvic cavity.

Prognosis.—Taken as a rule, prolapsus uteri of the first and second degrees, unless relieved by proper mechanical and operative procedure, will eventually result in a prolapse of the organ to the third degree. A cure of the displacement is scarcely to be expected by natural means,—that is to say, by a spontaneous restoration to the normal position,—with one exception, namely, the possibility that the processes of involution which follow parturition may, under proper precautions, restore the uterus and its ligaments to their normal position and tone. There is nothing necessarily prejudicial to life in prolapsus uteri of any degree, and a woman with her uterus and vagina dangling between her thighs may thus attain the age of eighty or more years, so far as this pathological condition is concerned.

Treatment.—The treatment of prolapsus uteri is either palliative or radical. Among the palliative measures for the minor degrees of prolapsus are, in the recent cases, astringent injections, tampons applied to the vagina, chiefly in the knee-chest position, with the view to contracting the parts and restoring them to their normal tone. As prolapsus in the minor degrees is associated with anteversion and retro-displacements, the pessaries, tampons, and the Faradic current of electricity are useful for these forms of prolapsus. When it comes to a prolapsus of the second and third degrees, with the use of astringent injection, and tampons made of cotton dipped in an astringent iodoform and tannin (equal parts), with the woman in the knee-chest position, and with the atmospheric pressure, the uterus is more or less reduced. Place two or three of these tampons well up around the uterus; the hips must be elevated, and the woman should keep the recumbent position for an hour or two after each treatment.

If the tampons should slip down, they may be removed and larger ones applied, the patient wearing a T bandage. A well-fitting abdominal bandage or body brace is useful in these cases. The woman, with instructions from her physician, can do this herself.

Pessaries.—They all, in course of time, cause excoriation and ulceration of the vaginal wall where they exert their pressure, and have to be removed until the wound is healed. None of them ever produces a cure; but they give, comparatively, some relief. The varieties of pessaries used for these displacements are hard rubber, glass, or wooden rings; aluminum is a good metal for this purpose.

Operative Treatment.—The diminution in size of the uterus can be attained by two measures, namely, amputation of the cervix or repair of the laceration of the cervix.

The closure of the laceration of the cervix should be practised in every case of prolapsus, no matter of what degree. Its object is not only to restore the cervix to its normal condition, and cure such uterine catarrh as may be present, but also to stimulate the organ to a diminution in size—a result which is well known to follow this operation.

INVERSION OF THE UTERUS.

Definition.—By inversion of the uterus is meant a more or less complete turning inside out of the body of the organ, so that in the complete degree the fundus uteri occupies a position lower than that of the cervix.

Causes.—These are either acute or chronic. The chief cause of *acute* inversion of the uterus of the complete variety is puerperal, the fundus uteri either being forced through the cervix into the vagina by spontaneous contractions of the uterus or by traction on the cord of the adherent placenta by the obstetric attendant. The chief cause of *chronic* inversion of the uterus, either of the incomplete or the complete variety, is the forcing downwards by uterine contractions of a fibroid tumor situated near the fundus uteri (usually incomplete inversion), and the drawing through the cervical canal of the tumor and the fundus by instruments in the hand of the operator (complete inversion). When a fibroid tumor inverts the uterus, so long as the inversion is complete, it usually starts from one side of the uterus where the tumor happens to be attached. It is only when the efforts of nature alone force the tumor down into the vagina, or the operator draws it down, that the inversion becomes complete. Chronic inversion of the uterus, either partial or complete, may occupy a number of months in its accomplishment.

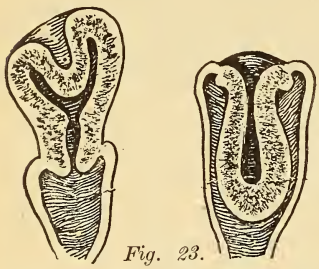


Fig. 23.

Incomplete Inversion of Uterus. *Complete Inversion of Uterus.*

Frequency.—Puerperal inversion is not commonly met with by the gynæcologist, because at the present day general practitioners are more apt to make a physical examination if anything unexpected occurs, and, therefore, discovering the inversion, proceed at once to rectify it. Complete inversion of the chronic variety is frequent in proportion to the forcing or drawing down of the tumor into the vagina, either before or during the operation for its removal.

Significance.—Inversion of the complete variety, when of puerperal origin, is of supreme importance, since the symptoms it produces,—that is, chiefly prolonged and violent hemorrhage,—weaken the patient so much that she will eventually succumb to the strain if not relieved. Inversion of the non-puerperal variety is in itself of little consequence, since it is but the result of another more serious causative element, namely, the fibroid tumor, which, to be sure, produces the same symptoms, namely, hemorrhage; but on removal of the tumor, if this can be done without injuring the uterine wall, the reposition of the inversion is easily effected, and the displacemnt in itself loses all significance.

Symptoms.—The symptoms of inversion are comprised in one word, hemorrhage, whether the hemorrhage comes from simple inverted uterus or from the fibroid tumor complicating and producing the inversion. Bearing down, feeling of weight, "dropping" sensation in the pelvis, are natural symptoms.

Diagnosis.—A patient presents herself for vaginal hemorrhage, and examination reveals a pear-shaped, oblong body, more or less filling the vaginal canal, and terminating above in the circle of the cervix uteri. This body bleeds on manipulation, is soft, semi-elastic to the touch, more or less painful. Bimanual palpation, if it can be thoroughly carried out, shows an absence of the uterine body in its normal position above the pubis. A sound passed into the groove within the circle fails to enter the uterine cavity. The peculiar-shaped body in the vagina, the absence of the body of the uterus above the pubis, the failure of the sound to enter into the uterine cavity,—these three points combined make the positive diagnosis of inversion of the uterus. A rectal examination can, if necessary, be made to confirm the absence of the body of the uterus in its normal position. In complete inversion a more or less irregular body is felt in the vaginal canal; on bimanual examination an irregular mass corresponding to the body of the uterus, but indented on one side, is felt above the symphysis pubis, and the sound enters to a limited depth, that is, instead of two and a half inches, only one and a half or two inches. The sound will enter to the opposite side from where the depression is perhaps to its normal depth, showing that the depth of the uterine cavity on the side of the depression is diminished. This would naturally point toward a partial inversion.

Differential Diagnosis.—A tumor corresponding exactly in shape

and size to the inverted uterus may be found in the vaginal canal; the relations of it to the cervix and its ring are exactly similar to those of inversion, and the uterine sound does pass into the canal. The thick walls may not allow the examiner to clearly map out the body of the uterus, supposing it to be in its normal position. The vaginal tumor is not particularly sensitive, whereas the inverted uterus usually is quite tender to the touch; but it bleeds, and the patient's history does not give any distinct information as to the occurrence of this condition. When one is in doubt as to the diagnosis being correct in such cases, it is a safe plan not to attempt to remove the supposed polypus, but to submit the patient to another examination, with a consultation with a specialist, to arrive at a true conclusion, and proceed accordingly. To amputate the inverted uterus would be a great and almost criminal error; and to attempt to replace a uterine polypus would be about as grave an error, certainly a very ridiculous one.

Treatment.—An acute inversion of puerperal origin does not occur often. We may, of course, state that its immediate return is the only proper treatment, and that a neglect to do so is a grave error on the part of the practitioner. Chronic complete inversion should, of course, be reduced as soon as recognized.

The methods for such reduction are manual, instrumental, and operative. Dr. F. Monde's *manual* method consists in placing the patient under an anæsthetic, and with the hand in the vagina and compressing the body of the uterus, either pushing the fundus upward or first attempting to return one horn or the other, while the fingers of the other hand exert counter pressure through the abdominal walls, and attempt to dilate at the cervix, which forms the great obstacle to the reposition of the organ. Emmet and Sims recommended pushing the fundus uteri straight up; Noeggerath first advised pressing up one of the horns of the uterus. The object is to dilate with the outer fingers the infundibulum, or ring of the cervix, sufficiently to enable the vaginal fingers to press the inverted body through it. Once the ring is passed by a certain portion of the body of the uterus, its complete reposition is easily effected. This manipulation is by no means as easy as it seems to be.

Fig. 22.
Polypus Simulating Complete Inversion of Uterus.

Instrumental.—Wing, of Boston, succeeded in the reduction of an inverted uterus with a very ingenious device represented by a conical plug, surmounted by a thick rubber ring, which was passed into the vagina over and against the fundus, and to the outer end of which were attached stout rubber tubes, which were again fixed to the posterior surface of a band passed around the waist of the patient. The steady pressure exerted by the elastic

traction of these tubes upon the plug in the vagina succeeded, after twenty-four hours or more, in gradually overcoming the resistance of the cervical ring against the return of the uterus, and the reposition of the inverted organ was thus effected. Packing the vagina with wool or cotton wads or antiseptic gauze has also been effectual in gradually reducing an inverted uterus.

Operative.—Amputation of the inverted uterus should always be considered as a last resort, to be performed only when all other measures have failed. If amputation is to be done, Dr. Monde recommends the elastic ligature as superior to any other method, because it gradually, by adhesive agglutination, closes the peritoneal cavity; and when the stump sloughs away, there is no danger of infection of the peritoneum.

CHAPTER VI.

FUNCTIONAL DISEASES—DISORDERS OF THE UTERINE FUNCTIONS.

Menstruation.—One of the special functions of the uterus, which may be deranged in several ways, as, more or less absent in amenorrhœa, more or less excessive in menorrhagia, or painful in dysmenorrhœa. They are not distinct diseases of the uterus, but derangements of its functions, which are expressive of many conditions, both general and local. Pathological conditions quite different, and even dissimilar, may enter into their causations, as in cough and dropsy, which are only symptoms. The underlying morbid conditions which give rise to them must be looked for. In many of these cases there are difficulties in the way of a thorough investigation. However, fortunately very correct inference can be drawn as to their underlying causative factors, from the symptoms of the case and from the age and social condition of the patient. On the other hand, at times a direct and thorough examination of the organs concerned is absolutely necessary for a rational treatment. A successful and scientific treatment of these functional disorders in all their manifestations implies a thorough knowledge of gynæcology.

Amenorrhoea.—Meaning absence of menstruation, which has technically speaking, an absolute and relative application. Absolute amenorrhœa means a complete absence of menstruation, and implies a duration of at least several months, even years. Relative amenorrhœa denotes menstruation which is delayed, or scant, and comes on at prolonged intervals. Again, the term applies to those who have never menstruated, a condition called "emausio-mensium." Cessation of the function after it has once been established is called "suppressio mensium." Amenorrhœa is a normal condition during pregnancy and lactation; but it is abnormal when, from the age of fifteen to that of forty-five, there is a menstrual suppression, not from pregnancy or lactation, but from nature or disease.

Etiology.—The general causes are, in acute disease, as follows: The menstrual flow usually ceases during convalescence from acute diseases, on account of the general debility and anæmia; hence its return is always an indication of a return to health.

Chronic diseases, depressing and exhausting in their nature, cause menstrual suppression.

Among these may be noticed chronic disease of the liver, the stomach, the intestines, the kidneys, and especially the lungs. Tuberculosis

affords a typical manifestation of amenorrhœa, almost always a lung disease. In most of these constitutional diseases the menstrual flow becomes more and more irregular, the intervals being lengthened. In chronic albuminuria, or general cancer, amenorrhœic anemia, chlorosis, malaria, syphilis, and general struma, the general organs lack sufficient nourishment to carry on this function, and they are followed by amenorrhœa. Defective hygiene causes it. In some of these conditions there may be no sanguineous discharge, but, instead, a profuse muco-purulent leucorrhœa. All cachexiæ are constitutional causes of amenorrhœa.

Physical causes are not uncommon; sudden and unexpected news, fright, grief, and great anxiety are causes of this menstrual disorder. An abrupt change in the place of living, associations, and climate frequently cause it. Young ladies who go from home to a boarding-school are apt to have amenorrhœa; so are immigrants to this country. There must be some change in the nervous system through the emotions. This is sometimes the case with the newly married, who have suspected the possibility of pregnancy. The fear of pregnancy following illicit coitus not infrequently leads to temporary amenorrhœa. All these conditions, it is said, can properly be called physical amenorrhœa. Insanity is almost always associated with amenorrhœa.

The local causes of amenorrhœa are an absence or a very imperfect development of the uterus. The uterus is oftener imperfectly developed than any other of the genital organs, certainly much more frequently than the ovaries. This condition is sometimes found when the whole physique is otherwise matured. Then there is also, of course, sterility. The uterus may be fairly well developed, but its growth delayed. The ovaries may be absent or illy developed, so that the sexual changes at puberty have not taken place. Such a condition is usually associated with the absence of, or imperfect anatomical and physiological changes of, the uterus, tubes, and vagina.

Attresia.—Attresia, congenital or acquired, are generally causes of menstrual retention, but not of menstrual suppression. There is far greater intolerance from the acquired than from the congenital causes. An imperfect hymen is the most frequent and least dangerous of these malformations.

Diseases of the ovaries do not rank first in frequency and importance as local conditions creating amenorrhœa. Rarely acute or chronic ovaritis causes this symptom, and cystic degeneration, passing on to the formation of a tumor, seldom does so. Women with large ovarian tumors become amenorrhœic towards the last, from a serious drain on the general health.

Chronic metritis, in its third stage of cirrhosis or uterine atrophy, has, for a prominent symptom, the amenorrhœic condition. Superinvolution of the uterus, which is a rare condition, first described by Simpson, is at times a cause.

Acute peritonitis, followed by chronic pelvic peritonitis, leads to amenorrhœa, from local structural changes induced in the ovaries and tubes.

The diagnosis of amenorrhœa is very easy, but the differentia of the varied conditions creating this symptom may require the most skilful diagnostician.

The prognosis depends upon the cause. Most cases are amenable to treatment. Some are utterly incurable.

The change of life, or the critical period of woman's life, is, "physiologically speaking, to the system at large of the elderly woman what the period of puberty is to that of the girl, or what the period of dentition is to that of the infant." It is not fraught with danger unless there is, or has been in former years, some serious local disease, which is very often the case.

The Symptoms of the Menopause.—It is very common, previous to the menstrual cessation, that certain vague nervous symptoms are felt. The most common are what are called "hot flashes," a nervous phenomenon, implying congestion of the nerve centers from any arrest of the flow, and relieved by a vicarious hemorrhage, as epistaxis (nose bleed), diarrhea, or leucorrhœa. The temper at times becomes irritable, and headaches, hysterical attacks, and unnatural fear, or sometimes melancholia, may be noticed. There are most usually changes in the physique. The woman grows more fleshy, and often develops a growth of hair on the chin or face. Fat in the abdominal walls, simulating pregnancy, is not uncommonly observed. Pruritis of the vulva and skin eruptions are not unusual. Sexual activity, where there was previous sexual frigidity, is not uncommon.

Amenorrhœa is one of the functional types in young women and young girls arriving at the age in which we may hope for the greatest amount of good from the use of electricity. Both the galvanic and faradic currents may be used alternately, or simultaneously, in this condition. In addition, however, while the electricity is being daily applied, or on alternate days, tonics, good food, and proper exercise are prescribed to suit each individual case. I have frequently seen chronic cases of amenorrhœa yield satisfactorily to the galvanic current of electricity after all other means have failed. If the amenorrhœa is due to chlorosis or struma, tonics of iron and cod-liver oil, raw eggs, and fresh milk, out-of-door exercise, good ventilation, and pleasant surroundings are of vital importance. So also is general faradization of the spinal vertebra; applying the positive pole over the nape of the neck and the negative over the epigastric region, turn on the faradic current slowly and very carefully, gradually increasing the strength until the patient can feel it gently over the epigastric region; it must not be given too strong; let it remain five minutes or more. Next place the positive pole between the shoulders over the vertebræ, holding the negative pole in the left hand from three to five minutes; then change the negative

pole to the right hand and give the same length of time, just strong enough to be plainly felt is all that is necessary. As the next movement of the poles, place the positive pole over the lumbar region on the left side of the spine, but well up against the spine, and the negative pole over the sole of the left foot, giving it the same strength and time that you gave the hand. Lastly, place the positive pole up against the spine on the right side over the lumbar region, and the negative over the sole of the right foot; give it from five to seven minutes, or from three to five minutes. On alternate days an electric brush may be used for general stimulation.

In case of amenorrhœa due to sudden cold, fright, or shock, place the positive pole over the nape of the neck, the patient lying on her side, and the wire brush attached to the negative pole; turn on the current gently, increasing it in strength until very perceptible to the patient, and apply the brush over the spine, and then all over the back, across the shoulders, down the sides, and over the hip-joints, keeping the brush all the while in contact with the skin, and also keeping the brush moving constantly over the back and spine, for about seven to ten minutes. Then the positive pole may be placed over the lumbar region, and the wire brush used over the right and left legs for five minutes each; also stroke the feet with the brush for two or three minutes. Next place the positive pole between the shoulders, and stroke each arm with the brush, also the chest and abdomen, from five to seven minutes. It will take thirty-five minutes for a general faradic treatment with the brush. The patient must be kept covered during the entire seance, exposing only the parts of the body to be treated at the time, in order to avoid cold. Give the constant current also three times a week, alternating with the faradic current in cases of amenorrhœa being due to cold, fright, or shock. The positive pole, or anode, is placed over the nape of the neck, and the negative pole, or cathode, is placed over the end of the spine; give from five to seven minutes, from thirty to fifty milliamperes; move the positive pole over the dorsal vertebræ, and the negative over the left ovary, and give from thirty to forty milliamperes, for five minutes; move the negative pole over the right ovary, letting the positive remain over the dorsal vertebræ, and give it the same time and strength as the left ovary was given. Next, move the positive pole over the lumbar vertebræ, about the waist-line, and place the negative over the hypogastric region, just above the pubes, over the fundus or body of the uterus, and give the current simultaneously, that is, both the galvanic and faradic at the same time as strong as the patient can bear without pain or discomfort, and give from seven to ten minutes. Lastly, exchange the negative flat electrode for a uterine one, either of platinum, copper, zinc, carbon, or aluminum, place it in the cervex-uteri, and the positive over the end of the spine, give this also simultaneously for five minutes as strong as the patient can bear without pain. Usually I give about ten to twenty milliamperes with the faradic current, which is felt by the patient more than the galvanic current; hence,

the milliampere meter is our guide for the desired strength, the faradic being the excitant current. This ends the seance.

In addition to the treatment of amenorrhea due to cold, fright, shock, grief, or great anxiety, by the means of electricity, I prescribe tonics, laxatives, exercise, and cheerful company; also some kind of pleasant occupation to divert the patient's mind from her present condition. I have found aloes and myrrh pills the most efficacious laxative. The dose, one pill night and morning, occasionally one at bedtime, is sufficient. The pills are to be taken regularly every night until the amenorrhœa is overcome. The tonics are elixir of iron, quinine, and strychniæ, a teaspoonful after meals, in a wine-glass of water, three times a day. The above plan of treatment of amenorrhœa, due to causes mentioned, has proven satisfactory in the writer's hands.

In cases of amenorrhœa due to an impoverished condition of the blood, from struma, chlorosis, or overwork, the faradic current should be applied for half an hour daily, or every other day, for the tonic effect; and in addition the patient should have plenty of rest, good food, and an abundance of fresh air and sunshine, and kind attention (there must not be any harsh treatment), tonics of iron, arsenic, and cod-liver oil, port wine and raw egg twice a day, dry climate, quinine for malaria, mercurials and iodides in syphilitic cases, which I have found to be the most effectual method of treatment for such cases.

Amenorrhœa due to acute diseases is overcome by such means, dietetic, hygienic, and medicinal, as will restore the general health. A nutritious and well-regulated diet, fresh air, and moderate exercise, with medicinal tonics, are called for. When the special diseases are cured, menstruation will in due time return. A progressive decline of the general health from chronic tubercular disease is evidenced by menstrual cessation, so reappearance of menstruation may be regarded as a favorable prognostic symptom. No special attention is to be given this pelvic symptom, but the whole treatment is directed to the pulmonary lesion. The conditions call for a warm, high, dry climate, with plenty of outdoor exercise, nutritious food, cod-liver oil—the pure Norwegian oil is considered to be the best—tonics, and the galvanic current of electricity given through the lungs and bronchials, also the throat and tonsils if they are affected with tuberculosis. Place underneath the left shoulder-blade a flat zinc electrode one and a half by three inches in length, covered with several thicknesses of surgeon's lint, wet in warm water with a little salt in it, it being made positive, and place the negative electrode of zinc, the same width and length, covered with lint in the same way, over the upper lobe of the left lung, and give from thirty to sixty milliamperes; in some cases patients can take eighty or more milliamperes. Give ten minutes; then move the positive electrode over the middle lobe of the left lung; give it seven minutes, with the same number of milliamperes as above mentioned. Next place the negative pole over the lower lobe of the lung, and let the positive remain underneath the scapula; give five minutes, and if the cur-

rent feels comfortable to the patient, give seven to ten minutes; give from fifty to eighty milliamperes. Treat the right side in the same manner as the left. Next place the positive pole between the upper part of the scapulæ or shoulders, over the spine, and the negative over the thorax; give fifty milliamperes for ten minutes. This ends the seance. On alternate days, treat the throat. Place the anode, or positive flat electrode, well covered with surgeon's lint, and wet with warm water with a little salt in it, over the left side of the spine, just below the nape of the neck, and place the negative round-sponge electrode, with handle, covered with surgeon's lint, wet in warm salt water (not too much water), over the left side of the throat; give from thirty to fifty milliamperes. Some cases can not take over twenty milliamperes. When this is the case, it is usually due to a recent cold. Then the poles may be reversed, the positive placed over the throat and the negative over the left side of the spine, to relieve the congested condition of the throat, as the current flows from the positive to the negative pole; give ten minutes. Treat the right side of the throat the same as the left side. Next move the negative pole between the scapulæ over the spine, and the round positive electrode over the bifurcation of the trachea, or hollow of the neck, and give from thirty to forty milliamperes, for ten or more minutes. When the throat is very irritable from a recent cold, I have often given twenty minutes over the bifurcation of the trachea in one seance, giving quick relief from an irritable cough. As the next move, with the two round electrodes covered with lint, place the poles over the tonsils; the positive should be placed over the most irritable tonsil, and give from twenty to thirty milliamperes, for ten or fifteen minutes; this ends the throat treatment in consumptive cases. However, in cases of tuberculosis of the tonsils the tonsils may be cocained with a fifteen per cent solution, using care that the patient does not swallow any of the cocaine. The galvanic current of electricity may be beneficially applied by placing the positive pole over the tonsil internally, the electrode being of suitable size, of carbon, or aluminum, covered with absorbent cotton, dipped in peroxide of hydrogen, and externally place the negative round electrode over the tonsil, corresponding with the inside positive pole, holding the tongue down with the left index finger, with a bit of absorbent cotton wrapped about the finger, which absorbs the saliva while the current is being given; give from ten to fifteen milliamperes, for five minutes. Treat each tonsil the same.

Amenorrhœa due to plethora is said to be an indication for the use of belladonna. For obesity a dietetic management with abundance of exercise, and the faradic current of electricity, has yielded the most excellent results in the writer's hands. First of all, the patient must be interested in her own case; otherwise she will not carry out the physician's directions as to diet. The following prescribed diet list for obesity I have found to be very excellent: She may eat freely of meat, poultry, game, fish, eggs, oil, cream, butter, cheese, gelatine, nuts,

spinach, asparagus, celery, oyster-plant, onions, cucumbers, sea-kale, radishes, sorrel, olives, water-cress, tomatoes, cabbage, sprouts, cauliflower, dandelions, mushrooms, beet-tops, turnip-tops, string-beans, plums, apricots, apples, gooseberries, watermelons.

Eat sparingly of squash, pumpkins, currants, strawberries, pineapples, sour cherries, sour oranges, muskmelons.

Eat very sparingly of parsnips, carrots, beets, yellow turnips, cherries, sweet apples, peaches, sweet oranges, prunes, figs, and dates.

Eat none of the following: Peas, beans, rice, corn-starch, sago, tapioca, macaroni, barley, corn (bread may be very brown-toasted, as zwieback), mush, potatoes, grapes, raisins, bananas, cake, pie, pudding, jellies, honey, ice-cream, preserves, sugar, molasses.

Of drink or beverages, all alkaline mineral waters, tea unsweetened; coffee may be sweetened with saccharine only; chocolate and cocoa when the starch is removed, and skim milk. Milk and all malt liquors and sweet drinks are especially forbidden.

The patient may drink freely of water after meals, but should drink slowly, as a too rapid drinking will overtax the stomach, as much as the half-masticated and hurried manner of eating interferes with digestion.

For the reduction of fat, that unfortunate theory, "Eat what you please, but drink nothing," is based upon the theory that water, the greatest dissolvent known, carries with it throughout the entire system the particles of nourishment that would otherwise remain packed in the intestines.

Great danger may arise from these accumulations being retained longer in the system than nature intended they should be, for the re-absorption into the system of poisonous matter is the cause of many serious complications.

All agree that the application of water to the outward surface is essential for health, and that the supply should be generous and frequent; yet many will deny the greater necessity of the internal washing of canals which have not the advantage of either air or sun for their purification.

Nearly all hearty eaters are troubled with constipation or too closely compacted fæcal matter, but drinking plentifully of pure water, and copiously flushing the intestines with warm water with a teaspoonful or two of salt added to it, once every three or four days, will give great relief in such cases. However, I have known of patients who were not plethoric flushing the bowels daily, to their injury; hence, too much flushing of the intestines should be guarded against. The faradic current of electricity should be given through the central nervous system, through the liver, and over the stomach and abdomen, down the spine, and from the sacral region down to the soles of the feet, and from the cervical vertebra to the palms of the hands, once every day for three months, then twice a week, and then once a week for two or three more

months until the patient's obesity is overcome. The patient can be taught to treat herself with a faradic current of electricity.

Massage is very useful in reducing obesity. Turkish baths, which may be taken once a week, are very beneficial in some cases where there is no heart trouble.

Rheumatic amenorrhœa calls for the salicylates. Physiological experimentation with the salicylates shows that they stimulate the menstrual secretion, as well as the hepatic secretions. Give five grains every six hours, in milk, both day and night, until rheumatism is relieved. Cimicifuga is a beneficial remedy for rheumatic amenorrhœa, and especially for delayed and painful menstruation. Guaiacum is an old-time remedy under similar circumstances. Strychnine and iron is a good muscle and nerve tonic. Pulsatilla is indicated where there is mental shock or fright. Apiol is an efficient emenagogue; it may be given in capsules of five drops for a dose, two or three times a day, for a week preceding the flow. Electricity, the galvanic current, is *par excellence* for all rheumatics complicated with amenorrhœa. The anode flat zinc electrode placed over the seat of pain, and the cathode placed on the thigh or on the sole of the foot or in the palm of the hand, and given twenty to thirty minutes, and from fifty to one hundred milliamperes, will relieve the rheumatism. Where there are several seats of soreness and pain, place the anode, or positive electrode, over each affected part, and the negative below at some point on the lower extremities or sole of the foot, or palms of the hands; give each affected part ten minutes or more, according to the acuteness of the case; give from fifty to one hundred milliamperes. If the case is chronic, electricity should be given every other day until the patient is relieved of rheumatism. Acute cases should have daily seances.

Caulophyllum, aletris-farinosa, and polygonum-hydropiperoides have been recommended for the amenorrhœic condition.

The hygiene of all amenorrhœic patients needs most careful looking after. A good, nutritious diet, an abundance of fresh air, outdoor exercise, and cold shower baths are never to be neglected. Sea bathing is almost always useful. A change of place is often highly beneficial, particularly from inland to the seaside. Marriage, too, is at times to be considered.

The uterine functions should not be forced, when the general system is struggling for existence. Very few remedies have any direct stimulating effect on the lining membrane of the uterus. Some of them, when given in large doses, cause the expulsion of the uterine contents, by stimulating its muscular fibers to contract.

Hot hip-bath and foot-bath are useless unless the function is about to appear.

Acute suppression should be treated by rest in bed, local warmth, and hot drinks, with half-grain doses of calomel with a grain of soda, an hour apart, until three doses have been taken; and in eight hours after the last dose has been administered, take a heaping teaspoonful

of Epsom salts in a half tumblerful of warm water, to move the bowels freely, and to relieve the general congested condition of the system. Iron stands first as a tonic, because of its hæmatic tonic action, increasing the blood supply of the pelvic organs. When the stomach is ready to receive tonic doses of iron, the dry sulphate, the carbonate, the muriated tincture, or the syrup of the iodide of iron may be chosen. The iron should be given with nux-vomica and quinine.

The following pill is considered sufficient:—

℞: Ferri sulphatis exsiccati.....ʒ ij
Quinæ sulphatis.....ʒ ij
Strychniæ sulphatis.....gr. i
Extracti gentianæ.....q. s.
Misce et fiat in pill or capsule, XL.
Sig.: One pill after each meal.

Blaud's pill may be given. Gude's Pepto-mangan is an excellent preparation of iron. Wyeth's preparation of manganese and iron, given in dessert-spoonful doses, in milk or water, after meals, three times a day, is a valuable remedy in all cases and conditions of this class.

The potassium permanganate and the bin-oxide of manganese are new remedies added to our list of emenagogues. Experience has shown that they are valuable remedies, administered for a few days or weeks preceding menstruation, in doses of one to two grains, three times a day. The best form for their administration is in compressed tablets, or in a gelatine-coated pill.

Electricity is the most reliable of all the emenagogues, being the most direct uterine stimulant that we possess. The galvanic and faradic currents may be used on alternate days, keeping in mind that the current flows from the anode, or positive pole, to the cathode, or negative pole. The primary current of the faradic should be used first. The negative pole is placed in the uterus, and the positive pole is applied externally over the body of the uterus, as strong a current as the patient can bear with comfort, a seance of fifteen minutes. Then place the positive electrode over the sacral region, and the negative on the inside of the thigh, and give a seance of five minutes. Treat the opposite thigh likewise. On alternate days use a mild galvanic current or a low amperage; place the positive pole over the left side of the spine, about the waist line, the negative placed over the left ovary; give twenty to thirty milliamperes, for five minutes. Treat the right side the same as the left; then move the positive pole over the body of the uterus, externally, with the negative placed in the uterus, and give five to ten milliamperes for five minutes. This treatment should be kept up until the patient recovers from acute suppression.

In uteri that are small and ill-developed, or atrophied from superinvolution or chronic metritis, or in cases where the internal genitalia are markedly dormant and atonic, the local use of electricity is the most efficient method of cure. Personally I can number many cases

which I have treated for sterility, and fertility has resulted from thorough electrical treatments.

If there is atresia of the vagina or uterus, the treatment is surgical. When the occlusion is low down, from an imperforate hymen, or in the vagina above the hymen, a free crucial incision, with thorough antiseptic drainage, is needed. This class of work should be performed by a gynæcologist.

Vicarious menstruation is a condition closely allied to amenorrhœa. It means a condition of the female system in which there is a regularly-returning discharge of blood from other parts of the body besides the uterus. This vicarious sanguinous flow comes from the nose, the bronchial tubes, the stomach, the intestines, or the rectum. The writer had one case of a young school-girl sixteen years of age, who had vicarious sanguinous flow from the mammæs regularly every month. The natural monthly flow ceased when the vicarious flow from the breasts appeared. To all appearances, the patient was in good health; she had no pain, and performed her school work daily without any undue symptoms of overwork. Iron and cod-liver oil was prescribed, and the faradic primary current of electricity was applied three times a week. The anode was placed over the left mammæ, and the cathode placed within the vagina by an appropriate vaginal electrode, it being carried well up into the left cul-de-sac, between the uterus and the vaginal wall, as near the ovary as possible, and the current given as strong as the patient could tolerate; the seance was given ten minutes. The right mammæ and ovary were treated the same as the left; then the anode was placed over the sacrum, and the cathode in the rectum; seance ten minutes. The patient recovered under the treatment.

A vicarious sanguinous flow comes from the nose, the bronchial tubes, the stomach, etc. Good tonics of iron, quinine, and strychniæ (Wyeth's Elixir is an efficient tonic), and the galvanic and faradic current applied alternately, as prescribed in amenorrhœa, are very valuable in such cases. A change of climate is beneficial, and a good, nutritious diet, exercise, cheerful company, and pleasant surroundings are needful in such cases.

MENORRHAGIA AND METRORRHAGIA.

Menorrhagia is an excessive menstrual flow, the opposite of amenorrhœa. There are menorrhagic conditions as to time, quantity, and duration, as well as an absolute menorrhagia. Thus, if menstruation appears too frequently, is excessive in quantity, or continues too long, the condition is menorrhagic.

Metrorrhagia means non-menstrual uterine hemorrhage.

Etiology.—Both menorrhagia and metrorrhagia are generally dependent upon a common cause, and both usually exist at the same time. They depend upon many and widely different causes, both constitutional and local.

The constitutional causes are plethora, anæmia, and chlorosis, debility from lactation, hæmophilia, puerpura, scorbutis, chronic valvular disease of the heart, chronic pulmonary diseases, as pneumonia and emphysema, hepatic disease, constipation, and abdominal tumors, and physical influences.

The local and pelvic causes are, local and peri-uterine congestion and inflammations, tubal inflammatory diseases, hæmato-salpinx, uterine congestion, chronic metritis, sub-involution of the uterus, chronic endometritis, fungoid granulations, cervical lacerations, uterine displacement, especially retroversions and retroflexions, uterine fibroids and polypi, cancer of the uterus, and the retention of the products of conception.

Uterine and ovarian congestion, followed by menorrhagia, may be provoked by excessive coitus. Menorrhagia occasionally from plethora. Stout, obese women generally have scant menstruation.

Any cause which eventually alters the quantity or deranges the quality of the blood, as plethora, anemia, chlorosis, or hæmatocele, may lead to excessive menstruation.

Any cause which impedes the normal return of the venous blood, as valvular disease of the heart, chronic pneumonia, or emphysema, hepatic, splenic, and renal diseases, abdominal tumors, or loaded bowels, are almost always attended by prolonged and profuse menstruation. Physical causes also act in the same way. Fright, fear, and excessive mental or emotional disturbances act as potently as do morbid physical conditions.

One of the most common causes is the presence of fungosities within the uterine cavity, either from chronic endometritis or from a retention of some of the products of conception. The profuseness of a menorrhagic attack is by no means in proportion to the size of an intra-uterine growth; a small polypus and fungosity may act as potently as large tumors.

Malignant disease of the uterus is almost invariably accompanied by menorrhagia and metrorrhagia. These are its first symptoms, and they are diminished only late in its progress. Many women become so accustomed to losing blood per vaginam that any beginning hemorrhage may be neglected. Many women labor under the impression that the change of life must be attended by an excessive menstrual flow. The cause of any excessive menstruation should always be sought, as this is invariably indicative of some disease.

Laceration of the cervix uteri is a very common cause of cervical erosion, eversion, and a general endometritis, with fungoid granulations, hence menorrhagia results. Parametritis and perimetritis have metorrhagic as common symptoms. In all uterine displacements and flexions, the uterus is the seat of more or less hyperemia from an impeded venous circulation.

Of the various displacements, retroversion is most commonly so attended.

Sub-involution of the uterus, in which the organ is enlarged, softened, imperfectly contracted, and congested, has menorrhagia for a symptom. Sub-involution is often the first stage of chronic metritis. The second stage of chronic metritis is also attended by excessive menstruation, and the menorrhagia does not cease until the third stage, or cirrhosis of the uterus, has commenced.

Treatment.—Rest in bed for the attack is the first consideration. In the recumbent position of the body, the pelvic organs, whether the seat of active or passive hyperæmia, are, through the influence of gravity, relieved to no inconsiderable extent of an increased blood supply. All tight clothing ought to be removed. The bed should be cool and not too soft. The food should be light and non-stimulating. Keep the bowels open and the rectum and the colon unloaded, and favor the return of the portal venous circulation, which is intimately connected with the pelvic. Occasionally one-fourth of a grain of calomel should be given every hour until four doses are administered; in eight hours after the last dose of calomel, take a saline mixture of sulphate of magnesia or Epsom salts—not too large a dose; a heaping teaspoonful usually moves the bowels two or three times; should it not do so, the salts must be repeated. After this an occasional cholagogue, followed by a saline mixture, as salts, may be administered with advantage, to keep the colon unloaded. An enema of warm water with a little salt added to it is advisable when the bowels do not move themselves; or a tablespoonful of glycerine in one pint of warm water injected into the bowels, and retained for a short time, is very effective in unloading the colon.

Chronic constipation may be overcome by mild salines, magnesia sulphate, Rochelle salts, cascara sagrada, small doses of podophyllin with nux vomica, or Wyeth's triturate for mild laxative. Black coffee taken upon rising early in the morning, on an empty stomach, is a most efficient laxative. One heaping tablespoonful of black coffee to one teacup of boiling water; let it steep for ten minutes on the back of the stove; must not boil; sip it very slowly, swallowing air with each sip of coffee, and it will usually move the bowels in half an hour. The air can best be swallowed with the small sips of coffee when the patient is in a recumbent position. The writer has used black coffee, as above described, for many years, for constipation, without ever having to resort to any other means. Neither milk nor sugar must be added to the coffee. The hot coffee stimulates the nervous system to quick action, also keeping the mind on what you are about. Psychic influence seems also to help; for if the mind is diverted from the object to be attained, the wind swallowed will return and escape by the mouth, when it will not do so if the mind is full upon the object in view, but will pass off through the natural channel, carrying with it the pent-up fæcal matter, down into the rectum.

The best medicinal hæmostatics will depend entirely upon the provoking causes. Should the fault lie in the heart's action, or in

retarded venous blood circulation, one of the best medicines is digitalis. A good tincture made from the English leaves, or a pure infusion, is said to be the best form. The writer has found Wyeth's heart tonic and stimulant to be very efficacious to overcome retarded venous circulation in these conditions, one triturate, taken three times a day, until the circulation is in a normal condition.

Morbid physical conditions are best relieved by the bromides. Bromide of sodium is one of the most useful. Chloral hydrate and bromide of sodium are very useful in promoting quiet and sleep.

℞: Chloral hydrate.....ʒ ij
Sodium bromide.....ʒ iv
Aqua menth pip.....ℨ vi
M. et fiat.

Sig.: Teaspoonful every three or four hours during the day, in a wine-glass of water.

To promote sleep, it may be taken every two hours; usually two doses have the desired effect. Menorrhagia from excessive coitus also calls for bromides, also hot vaginal douches every six hours, with rest in bed, until the menorrhagia is overcome.

Faulty conditions of the blood from anemia, chlorosis, excessive lactation, hæmophilia, or defective hygiene, are best improved by a good hygiene, weaning of the child, and internal administration of iron and other tonics. As a rule, iron is contra-indicated during menstruation, especially if the flow is excessive, but to this rule, as to others, there are exceptions. Iron in the form of muriated tincture proves to be an excellent means for checking excessive menstruation dependent on marked anæmia, hydræmia, and hæmophilia. In most cases the iron is to be given only during the menstrual interval.

Menorrhagia from plethora demands a restricted diet, and the use of the salines and the bromides. Take Rochelle and Epsom salts, equal parts, a heaping tablespoonful every morning in a half tumbler of warm water. A little lemon may be added to make it more palatable.

Arsenic is a most valuable hæmostatic in the menorrhagic condition of young girls, as well as of women nearing the menopause. Menstruation, which at either time of life comes on too frequently, continues too long, or is too profuse, being purely functional, is best met by Fowler's solution of arsenic. Doses, from two to three drops, three times a day, after meals. It seems to be indicated when iron is contra-indicated, and may be given during the interval. Hydrastis canadensis has been an efficient remedy in the writer's hands, given in half-dram doses between the regular periods of the flow. During the regular period, ergot may be used, combined with the hydrastis, equal parts. Give half a dram three or four times a day. The hydrastis may be given for months; may be taken in a little water, half an hour before meals. Twenty-five or thirty drops is an ordinary dose.

Ergot stands at the head of the list of all medicines as a uterine hæmostatic, because of its stimulating effect in contractions of the involuntary unstriated muscular fibers, wherever found. The more soft, flabby, relaxed, and engorged with blood the uterus is, the more pronounced will be the good effects of ergot.

Quinine is the remedy when the disease is malarial in origin. Ergot may be combined with the quinine for malaria. Nux vomica increases the action of ergot, hence small doses may be combined with the ergot and quinine.

Hamamelis is one of several useful remedies; it is taken internally in the form of the fluid extract. It is an American remedy, and has been utilized for hemorrhages from all parts of the body, and for varicose veins, hæmorrhoids, and for any slow or long-continued flux; when the blood is dark and venous, and the hemorrhage is passive in character, it is the remedy *par excellence.*

For flabby, enlarged, sub-involuted uteri, after delivery at term, and after abortions, also in some forms of chronic endometritis before or following the removal of fungosities, and in chronic retroversion, viburnum prunifolium combined with hydrastis canadensis, equal parts, should be given in doses of half to a teaspoonful, between meals, in a wine-glass of water, three times a day. Cannabis indica is highly recommended by some writers.

For the hypodermic use of hydrastinin, a ten-per-cent solution may be given hypodermically. Use Lloyd & Brother's, Cincinnati, called "Lloyd's Specific Medication."

The action of all medical agents should be enhanced in bad cases by local applications. Cloths wrung out of hot water, or a rubber bag filled with ice-water or pounded ice, may be applied over the hypogastric region, having one or two thicknesses of flannel laid over the hypogastric region, and the ice-bag on top of this to prevent freezing of the skin. The writer prefers heat. Use very hot vaginal douches, as hot as can be borne on the back of the hand; this is a quick and efficient test when there is no thermometer at hand. Elevate the hips; from one to two or even three gallons may be given every six hours. While the hot douche is being administered, add enough hot water to what is being given, to keep up a steady heat, being careful not to have it too hot, as it would injure the vaginal walls. The temperature of the water may be 125 degrees or even 130 degrees Fahrenheit. A salt solution of warm water, one pint of warm water with one level teaspoonful of salt added to it, may be injected slowly into the rectum in cases where the patient is profoundly anæmic from the loss of blood. This is a most excellent way to revive a swooning patient, thereby stopping the flow, and sustaining her by the absorption of the saline fluid. In emergency cases place vaginal tampons, made of absorbent cotton dipped in glycerite of alum, against the os uteri after the douche. Almost all families have alum at hand. Dissolve a teaspoonful in a teacup of boiling water, let it cool down to about the same heat as for a vaginal

douche, dip the tampon of cotton in the alum, and pack it around the uterus, filling the vagina; this will usually check severe hemorrhage. If you have no medicated cotton at hand, use small strips of an old linen handkerchief, previously dipped in boiling water, then dipped into the alum water, pack it well up against the os uteri, and fill the vaginal vault with strips of old linen dipped in the alum solution; this should be done immediately after giving the hot vaginal douche. The packing should not be removed for seven or eight hours, when it may be removed and another hot douche given, and dry absorbent cotton, sprinkled over with a little tannin and iodoform, should be packed firmly about the os uteri, filling the vaginal vault down to the outlet with pure absorbent cotton. Allow it to remain another eight hours; then repeat the douche, and packing also if necessary, daily, until the patient is relieved. Many authors recommend letting the dressing remain from twelve to twenty-four hours before removing it. Should this vaginal packing fail to check the hemorrhage, the uterine cavity is to be packed with sterilized gauze, after the uterus is dilated with the metallic forceps and curetted. This dilatation and curettage is not to be neglected in many of these cases of chronic endometritis.

The following principles expressed by Dr. Keating should ever be borne in mind, in the treatment of menorrhagia: "In all cases, if any local interference is needed, see that the uterine canal is kept open; obtain and maintain a patulous uterine canal. This itself tends to arrest the bleeding. Then remove the foreign bodies, products of conception, fungoid granulations, intra-uterine polypoids, and fibroid tumors. During the intervals of menorrhagia, the judicious and thorough use of the intra-uterine curette is one of the best means of promptly and safely curing many of these cases. Its use should precede any intra-uterine medication. The best local uterine medicaments are Churchill's tincture of iodine, iodized phenol, and iodo-tannin."

These medicaments may be applied with a probe wrapped with cotton, or with the intra-uterine syringe. Intra-uterine injections are said to be safe, if the cervical canal is patulous, if the fluid is warm, if no air is injected, and if no force is employed.

Cancer of the uterus calls for hysterectomy, partial or complete.

Mal-positions of the uterus which give rise to menorrhagia are treated by replacing the uterus in its proper position by tampons, by electricity, or by pessaries. Coexisting chronic endometritis is to be treated by dilatation, curettage, and packing. Lacerations of the cervix and their sequelæ call for curettage and trachelorrhaphy.

In bad cases of uterine hemorrhage, dependent upon fibroids and chronic affections of the endometrium, local galvanization of the uterus is one of the most worthy therapeutic agents that we possess. It is best to use the curette a week before commencing the use of galvanization. The positive pole, with a suitable sterilized electrode of iridium or platinum, should always be applied within the uterus. The effect of the positive pole is to coagulate the albuminous particles in its

immediate vicinity, and thereby produce a hardness of these tissues. This characteristic action varies, with the strength of the current, from slight congealing and hardening of the tissues to general coagulation and solidification for a considerable space around. Positive galvanization is a most potent hæmostatic—a large flat electrode of pure tin or zinc, four by six inches, covered with eight or ten thicknesses of surgeon's lint dipped in warm salt water, and placed over the abdomen (the electrode being negative), and a piece of oilcloth or oil-silk placed over the electrode, also a towel over the oil-silk to prevent wetting the patient's clothes. The patient may place one or both hands over the electrode to keep it firmly in contact with the skin, or a broad bandage may be drawn around the waist and over the electrode and fastened tight enough for comfort, yet it must not slip during the entire seance. The vagina should be washed with an antiseptic solution previous to placing the positive uterine electrode into the uterus. Give from forty to fifty milliamperes, from fifteen minutes to half an hour; the reverse current may then be given about one minute, giving only about twenty milliamperes, to loosen the positive electrode, which sticks to the uterine tissues or fibroids; then the electrode can easily be removed. After each uterine treatment, wash out the vagina with an antiseptic solution. This treatment should be repeated every other day until hemorrhage ceases, and the tumor is reduced. If the hemorrhage is due to endometritis, not more than from twenty to forty milliamperes should be given in the endometrium or in the fundus of the uterus. The positive is placed in the uterus, and the large flat electrode over the abdomen.

Chronic endometritis with hemorrhagic vegetations is very successfully treated with the galvanic current, the positive electrode being made active in the first stages of endometritis and metritis. In the third stage the negative electrode should be used in the uterus. The absorption of the hypertrophied tissue is stimulated by the inter-polar effect, while the polar effect is localized on the diseased endometrium and its immediate surroundings. The seances may be for fifteen minutes, once in two or three days, giving from thirty to fifty milliamperes in some cases; others require only from twenty to forty milliamperes.

DYSMENORRHOEA.

Dysmenorrhœa means difficult or obstructed menstruation, with pain preceding, accompanying, or following the menstrual discharge.

A certain sense of pelvic fulness or a bloated feeling is usually expressed, and attends, more or less, the menstrual function; but as normal menstruation is not attended with any special pain, the painful menstrual period is called dysmenorrhœa. All chronic inflammatory pelvic diseases which are attended with pain at the menstrual interval, have more pain at the time of the flow, but this is not dysmenorrhœa. Neither are those cases instances of dysmenorrhœa in which inter-

menstrual pain comes on with marked regularity about the middle of the inter-menstrual period. Dysmenorrhœa is one of the most common of the various menstrual derangements, and manifests itself by pain, which varies greatly as to frequency, time, duration, and severity. As it stimulates other pelvic affections, they are sometimes taken for it, and *vice versa.*

"Dysmenorrhœa is properly divided into the following varieties: The neuralgic, the congestive, or inflammatory, the obstructive, and the membranous." We meet with all these forms in general practise, and they have symptoms more or less in common, but they are different in their morbid conditions. As a rule, the dividing line between the varieties is not well marked. Normal menstruation depends as largely on a good condition of the constitution at large as on a healthy state of the intra-pelvic organs. Hence dysmenorrhœa may be constitutional or local in its origin. The variety known as ovarian differs from the others more in location than in kind. Spasmodic dysmenorrhœa is a term applied to the neuralgic form in which there is a spasm of the circular fibers about the os internum.

Neuralgic Dysmenorrhoea.—Neuralgic dysmenorrhœa is a variety in which no special disease of the uterus or the appendages may be detected, except a tenderness on pressure; or in bimanual palpation there is usually found to be a tenderness in the ovarian region and along the tubes. Physical exploration often shows no alteration in size, shape, position, consistency, or vascularity of the pelvic organs; no structures will be noticed, or if any are noticed in any case, the morbid condition is quite uncertain as to location, quantity, or variety, no two cases being alike. The most severe types are seen in the nulliparæ, in which there is no structural lesion of the uterus. The insertion of the uterine sound or an electrode into the interior of the uterus will elicit pain identical in kind and degree with the dysmenorrhœic pain. A slight discharge of blood sometimes follows the use of the sound, even when very carefully done. The nerves of the endometrium are in a state of hyperesthesia, a neuralgic condition. This hyperesthesia is mostly of the internal os uteri. A fissured state of the neighboring endometrium, inducing a spasm, may at times excite a contraction such as we see in anal fissures, which are very painful. In such a state menstrual pain will be excited by the influx of the blood into the tissues. The greater the tension and the rigidity of these tissues, other things being equal, the greater the pain. A similar unyielding character of the tissue is present in some cases of chronic metritis; with it there is undue vascular tension and a compression of the end nerves, which are always irritable. When the flow is well established, the swelling subsides, and the tension is relieved.

Causes of Neuralgic Dysmenorrhoea.—The constitutional condition must first be determined. A local neurotic state may, by the stimulus of the physiological pelvic congestion, be provoked to pain, incident to the oncoming menstruation. The pain is increased by the presence of

the hemorrhagic flow within the uterine cavity. The local neurosis, an expression of the nervous system in which there is an exalted sensibility to pain, shows itself by general hysterical phenomena, spinal irritation, neurasthenia, and local and general neuralgia. Pain, like age, is relative. The causes may be the same, but no two patients suffer exactly alike. Anæmic and chlorotic states of the blood always predispose to neuralgic dysmenorrhœa.

Rheumatism and gout are direct exciting causes. The rheumatic dysmenorrhœa resembles neuralgic. All habits of the body conducive to indolence, want of proper physical exercise, and faulty methods of dress, by enervating the nervous system lead indirectly to dysmenorrhœa. Hence, the disease is relatively more common among the upper classes. Excessive venery and masturbation favor its development. General ill health retards easy and physiological disintegration of the intra-uterine membrane. These diseases are too often due to a poor inheritance, a defective hygiene, a forced education, and the false stimulus of our modern and artificial life.

Symptoms.—Every possible kind of pain may be experienced as to time, duration, location, and severity. Some cases are so pronounced that pain is felt at the very inception of the menstrual function, and continues with an increasing force for years after, until it becomes very severe, most dreaded, spasmodic, and agonizing. In this neurotic variety the pain is intermittent, remittent, or continuous. Again, it may start after years of painless menstrual life; for instance, commencing after marriage. Severe types of the disease are often associated with reflex headaches, sympathetic nausea and vomiting, or neuralgic pains elsewhere, at the menstrual times, seemingly supplementing or superseding the localized uterine pain. Other organs of the pelvis, as the bladder and rectum, become affected by sympathy. The breasts become tumid and tender. Sometimes there are periods of uncertain length during which there is little or no pain, after which there may be a relapse. Such periods are noticeable after physical or mental recreation, a change of habits, and during and after a time of traveling, with its manifold divertisements.

Severe dysmenorrhœal attacks are always attended and followed by such prostration, so that weeks are needed for a full recuperation. The pain is felt and located in the ovarian regions, extending from either side down to the os uteri, as is usually described by patients, as traveling from the ovary low down in the vagina, and at other times across the lower hypogastric region about the fundus of the uterus. Often pain is felt in various parts of the body, and especially about the region of the heart. It comes on soon after the first commencement of the flow, is most severe during the first day, becomes less during the second day, and least toward the last. The discharge may be scanty or profuse, or may consist of clots. The pain in severity seems to be in inverse ratio to the quantity of the flow. The diminution of the flow is not so manifest in the neuralgic as in the congestive variety. Neu-

ralgic dysmenorrhœa is by far the more common variety. Commencing early in life, it is found more often in those who are subject to the various neurotic diseases.

One of the most common pathological lesions in this variety is antiflexion of the uterus, or some defect of the uterus. The flexion itself does not cause the painful menstruation so much as it does when the uterus is antiflexed, and it may be because the uterus is ill-developed and neurotid.

CONGESTIVE AND INFLAMMATORY DYSMENORRHOEA.

Pathology.—This variety having more distinct symptoms, any cause, constitutional or local, which promotes or perpetuates active or passive hyperæmia of the uterus, may lead to it. The inflammatory types are of a chronic form, and may not only complicate the uterine tissues proper, but likewise involve the parametric structures,—tubal, ovarian, and peritoneal.

Symptoms.—Pain is usually present for days prior to menstruation, increasing each day as that function approaches, and mitigating, more or less, after its appearance. The woman feels more at ease after the flow is established, contrary to the neurotic variety.

The diagnosis is based on the symptomatology, and on the signs found on physical examination.

Ovarian dysmenorrhœa implies ovarian congestion or inflammation. Some defective development of these organs predisposes to neuralgia, or a varicocele of the pompiniform plexus of the organ if present. Scanzoni suggested that the ovarian pain may be due to the maturing of a graafian vesicle lying deep in the ovarian stroma.

OBSTRUCTED DYSMENORRHOEA.

The essential condition of this variety of dysmenorrhœa is a retention of the menstrual secretion. "Abnormities of the uterine cervix, congenital and acquired, with stenosis, are by no means uncommon. Of the congenital form there is especially the elongated and the conoid infra-vaginal cervix, with the pin-hole os of the acquired; that which arises from chronic inflammation of any of the tissues, and especially that which results from the vicious use of certain caustics. This stenosis is sometimes very great, and there may be almost complete occlusion. Flexions of the uterus can create obstruction only when they are sharp, and the curvature is present to the second degree. Dysmenorrhœa associated with antiflexion does not come from any obstruction of the canal." (Palmer, M. D.)

Some standard as to the size of the cervical canal is usually accepted. Tilt has said, "When the cervical canal will not allow an ordinary sound to pass through it easily, it ought to be dilated or divided." Sims denied that the easy passage of a medium sound into the cavity is proof that there is no need of surgical interference. But the size of the canal, like the menstrual flow in quantity, is relative and

not absolute. The best evidence of obstruction is obtained when the withdrawal of the sound is followed by the pent-up secretion or blood. Besides this, there are narrowings and tortuosities of the uterine canal from the presence of intra-uterine and interstitial fibroids. Membranous dysmenorrhœa is clearly due to impeded menstrual flux, for as soon as the false membrane is expelled, the pain is relieved, and the uterus is at rest. All these circumstances,—the seat and kind of pain, intermittent, expulsive, and resembling labor, and the duration and the intermission of the flow,—may be more or less characteristic. Such pain is called expulsive, for the uterus is struggling to overcome a resistance, also to expel its contents.

It is not difficult, in a certain sense, to understand how all the varieties of dysmenorrhœa (but not all cases) may at times be attended with a certain narrowing of the channel of the uterus or uterine canal,—the neuralgic by a spasm of the circular fibers, especially at the internal sphincter of the cervix; the congestive dysmenorrhœa by a swollen endometrium, clots of blood, and broken-down mucous membrane; and the membranous by its false membrane. That the oft-repeated attacks may lead to structural changes, is well understood. The neuralgic dysmenorrhœa may lead to congestive. All dysmenorrhœa should not be regarded as obstructive, and for this reason "there is a want of conformity between the seeming causative lesion, or abnormity, and the symptoms."

Not only, as stated, may there be dysmenorrhœa when no abnormal conditions of the uterus as to size, shape, condition, or position can be detected, but, on the other hand, well-defined abnormities of the uterus, as the pin-hole os, the elongated cervix, the contracted canal, the flattened and ill-developed uterine body, and flexions, may be present, and there may be no dysmenorrhœa.

Associated with organic diseases or not, sometimes developed but more often aggravated by them, clinical evidence points to the conclusion that neurotic features are the only ones in many cases, and they are manifest more or less in all.

MEMBRANOUS DYSMENORRHOEA.

Pathology.—"This variety, the least common, consists in casting off, in shreds or in complete sections, of the superficial layer of the uterine mucous membranes. The cast-off film resembles a product of conception, and its expulsion has been mistaken for an early abortion. It is soft, comparatively thick, with many perforations, the sites of the utricular follicles. It is the lining membrane of the uterus, hypertrophied in all its structures, as in pregnancy, hence called the menstrual decidua. But the absence of the chorionic villa and the decidual cells, proves that it is not a product of pregnancy."

Two views in the main are held: That its production is the result of some ovarian disease (Tilt and Olshausen); that it is a desquamation

or exfoliation of the uterine mucous membrane (Raciborski and Simpson.) Klob, whose opinions are widely accepted, says, "It is an exudation from endometritis." Braum also accepts this view.

Symptoms.—The dysmenorrhœic pain begins at the inception of the flow, and increases in severity until the sac is completely expelled. The pain resembles those of an early abortion or the first stage of parturition. The menstrual flow increases in quantity until the expulsion occurs. The pain and flow cease together.

Diagnosis.—As the expelled matter may be mistaken for the products of an early abortion, or a mass of blood clots, polypus, or diphtheritic exudations may be spontaneously expelled, a careful physical and microscopical examination may be required; this once made, no doubt will remain.

The prognosis for all varieties of dysmenorrhœa is for the most part favorable. The longer it is let alone, the more difficult it is to effect a cure. The difference in the curability depends largely on the fact that the impressionability of patients to pain becomes more and more marked. Nothing so increases the susceptibility of the nervous system to pain, as does the almost constant use, by many of these patients, of opiates in some form. Under these circumstances, the abuse of opium, and of the whole list of narcotics and stimulants, is very great. "They induce a condition of the nervous system, a subjective state of pain, exaggerating the patient's sufferings, and demanding relief at any cost, more difficult to overcome than the original disease." The neuralgic variety of the malady is more amenable to treatment than formerly, and the great majority of cases are entirely curable. The congestive form is easily relieved; the obstructive is controllable; but the membranous is the most stubborn to combat.

Treatment of Dysmenorrhoea.—The proper diagnosis is essential in all the varieties of dysmenorrhœa. After having determined the cause or variety of the painful menstruation, and especially the condition of the uterus, the ovaries, the tubes, and the parametric tissues, in all cases in which any local examination is justifiable, the treatments may be divided into that which is appropriate for the time of the flow, to relieve pain, and that which is suitable for the menstrual interval, to prevent pain. The latter is more curative than the former. A bad constitutional condition favors the disease, and in all long-continued cases the general health is undermined.

We will first consider the constitutional treatment for the menstrual times in general.

For the attack of pain of course no local treatment is needed, except what the patient can employ herself. Usually heat applied to the seat of pain, rest in bed, and some kind of warm drink, perhaps hot water with a little gin or whisky added to it, are about the usual methods of home treatment. A great many remedies have been employed to relieve pain, but the author will refer to personal experience with patients, describing treatments which she has found to be

very useful. Use the galvanic current of electricity, the anode (active) over the seat of pain, and the cathode over the lumbar region; give about forty minutes' treatment over each seat of pain. Of this treatment we will speak more definitely further on; but it has been more useful, and has given better results in relieving and curing pain in all the varieties of dysmenorrhœa, than all the medicines the writer ever used. It takes plenty of time and patience, and special care that the current is properly directed; keep constantly in mind that the anode is sedative, and that the current travels from the anode to the cathode, and also be sure of the proper time given.

The medicines usually prescribed are as follows: Pulsatilla; the tincture is useful in the neurotic types of the disease, but is not contra-indicated in any form. It is best given in five-to-ten-drop doses, three times a day, for a few days previous to the inception of any painful period, and should be continued in similar doses, given more frequently at the time for pain, if the pain is then present.

The tincture of cimicifuga may be administered in a similar manner. It is useful in the neuralgic form of the disease. It is generally efficacious. It is useful in chronic rheumatism, complicating menstrual pain, but the salicylate of soda is to be preferred, as we know that it has a more specific effect upon all rheumatic complications; it also influences the menstrual flow.

Guaiacum, in the ammoniated tincture, is said to be useful in the rheumatic form of painful menstruation.

Viburnum prunifolium is beneficial, and is much prescribed, united with gelseminum.

℞: Ext. viburnum prunifolium.....℥ ij
Tinct. gelseminum.....℥ i
Tinct. cardamoni comp.....℥ ss
Syrupi simplici.....℥ jss
M. Sig.: Teaspoonful every two or three hours.

All these last remedies act best when the flow is not scanty. The bromides of sodium and of potassium, in ten-grain doses, are given to relieve nervousness in the ovarian types of dysmenorrhœa. The galvanic current of electricity is the remedy for cases with rigidity of the cervix, and for the spasmodic form of this disease. Gelseminum is also prescribed for rigidity. Cannabis indica is a nerve stimulant, an anodyne, and an anti-spasmodic. It acts somewhat like ergot, but more promptly and energetically. It is to be preferred to opium to relieve pain.

Nitro-glycerine, in doses of one drop of one-per-cent solution, is sufficient for young girls fourteen and fifteen years of age, and will overcome vasomotor spasms, which are characterized by pallor and coldness of the skin.

Apiole, or apaline, in capsules of three minims each, every two or three hours, in cases where severe pains precede the appearance of the flow, and in cases where the flow is scanty, is very beneficial.

Opium is most frequently prescribed. It is often abused, and yet at times, where the pain is so extremely severe, it has to be resorted to. More harm than good has been done by its administration. It is too easy a matter to cultivate a fondness for its use. Only an extreme necessity would justify its use by the mouth or hypodermically. It is better to apply hot fomentations over the seat of pain or use a hot-water bag, and bear all the pain possible, before resorting to opium at all. Of course the extreme pain calls for its use. Opium is sometimes prescribed in the form of a suppository, composed of the extract of opium, one grain, extract belladonna, one grain, to be given by the rectum. Usually one dose is all that is needed. Often nausea follows its use. If this is the case, a half cupful of strong black coffee relieves this condition, if it is due to the ill effect of the opium.

All cases of dysmenorrhœa are best relieved by rest in bed, from the commencement of the flow, and heat applied to the extremities. During the interval, a constitutional and local treatment is needed.

Hygienic conditions must first be looked after. The greatest care must be observed in regard to good, nutritious diet, bathing, exercise, and mental exertion. The bowels should be evacuated daily; and systematic cholagogue or liver medicine, with saline mixture following the cholagogue eight hours after it is administered, is called for in all congestive and inflammatory varieties.

Marriage in many cases is favorable; bearing children overcomes the dysmenorrhœic state in some cases. Many women who are afflicted with dysmenorrhœa, are sterile. Such cases require the galvanic current of electricity; the cathode placed in the cervix, and the positive placed over the hypogastric region, giving low amperage—from five to ten milliamperes—for fifteen minutes, daily, for a week before the beginning of the expected flow; and, if this treatment is persevered in, most cases will become fertile, as has been proved by the writer. The obstructed cases call for dilatation of the cervix, and curettage, followed, two weeks after the dilatation, by the galvanic current of electricity. Many cases have been made fertile under this method. Marriage is said to be contra-indicated in the congestive, obstructive, and membranous variety. The writer believes that marriage is best in all cases, since we have the galvanic current added to our list of therapeutical remedies, and the most efficacious of all in this special disease; so that in cases of sterility the congested condition is in a measure removed; the patient might become impregnated, which will, in all probability, cure the disease.

Many patients who are sufferers from dysmenorrhœa are anæmic, and a scanty flow is more common than a profuse flow. Iron is called for in these conditions, J. Wyeth & Bros.' iron and manganese, peptonated. Dose for an adult, from one teaspoonful to one tablespoonful, three or four times a day, after meals. The best preparation in pill form is the dried sulphate.

R: Dried ferrum sulphate.....3 ss
Quinæ sulphas.....gr. xv
Ext. nucis vomici.....gr. ij
Misci et fiat capsules, xxx.
Sig.: One after meals three times a day.

Compound syrup of hypophosphites and cod-liver oil are very useful in fortifying the system. Arsenic is called for when the flow is too profuse. In the chronic form of this disease, mercuric bichloride with tincture of cinchona is recommended. The general nutrition may be improved with cod-liver oil and malt extracts, with a full diet. Arsenic and mercuric bichloride in minute doses, long continued, are the best remedies for the membranous forms of dysmenorrhœa. All excitements, both general and local, as well as undue sexual intercourse, dancing, and the prolonged use of the sewing-machine, are to be avoided.

Dilatation of the cervix by expanding forceps, as Goodell's or Palmer's, and curettage and packing with gauze, as prescribed, may be followed in two weeks with internal uterine treatment, negative and active, with a low amperage. This favors the expulsion of any debris left from curettage, which is sometimes the case; it also acts favorably in a tonic way, inviting the blood to the illy-nourished uterus, and bringing about a normal condition of the organ. In all cases of too much flow the positive must be made active in intra-uterine galvanic treatment, with a low amperage, from five to fifteen milliamperes, and from ten to fifteen minutes' treatment being sufficient to control the abnormal flow. This treatment must be conducted under antiseptic precautions, the patient being instructed to take a hot vaginal douche, with a little carbolic acid in the water, before coming to the office for treatment. The operator must subject all instruments to boiling water, and the uterine electrode must be boiled for two or three minutes before introducing it into the uterus, and dipped in boiling boracic-acid solution just before the operation. The uterine electrode may be wrapped at the tip end with a small bit of absorbent cotton, very tightly, and a bit of the cotton wrapped along the electrode, far enough back to insure it not to slip off in the uterus, when the electrode is removed. The bit of cotton holds a little of the boracic-acid solution, that you have dipped it in before introducing it. It takes a little practise to wrap the electrode evenly and tightly, and with not too much cotton, as it would not admit the electrode's being introduced easily; but with a little practise this can be easily acquired. In thus preparing the electrode, it is easier to move it about in the uterus, while giving the uterine treatment. During the seance the electrode in utero should be moved every three minutes; first, say, to the left, then to the right, next to the upper part of the fundus, then lastly bring down the electrode to the internal os of the uterus. If there is much abnormal flowing, give as long as five minutes at each move of the electrode, giv-

ing low amperage. From five to fifteen milliamperes will control this condition. After giving this treatment, Churchill's tincture of iodine may be applied as far up in the uterus as the applicator may be made to go without pain; then leave a cotton tampon, anointed with vaseline, well up against the os uteri, with a string attached to it, instructing the patient to remove it the next day and take a vaginal wash. The treatment should be made every third day; in some cases every fourth day suffices.

Chauncey D. Palmer, M. D., gives his treatment of dysmenorrhœa by electricity as follows: "Theoretically, electricity appears to be strongly indicated in most cases of dysmenorrhœa, and experience has substantiated this view. It is especially indicated in the neuralgic form of the disease, but it is not contra-indicated in any variety. General, and possibly local, faradization does good, but the galvanic current is more potent for good. It should always be given with an intra-uterine metallic electrode, a method which implies that the best antiseptic precautions are to be called into requisition. The vagina should be washed out with an injection of hot bichloride solution,—one to a thousand,—and the intra-uterine electrode, first cleansed and then dipped in a strong solution of the bichloride, is applied to the fundus uteri, while the other electrode is placed over the abdominal wall. The polar effect should always be considered. The positive pole is used if the uterine canal is patulous and the menstrual flow is too free or too long continued. It is more useful than is the faradic in controlling pain, diminishing congestion, and lessening irritation; hence, as a rule, it is to be chosen. When, however, the menstrual flow is very scanty, the uterus small, and its canal contracted, the negative pole applied topically will do more good. The seance should continue for fifteen minutes at least once a week during the menstrual interval, and the strength of the current should be from twenty to forty milliamperes. Very few cases will resist this treatment. If it is given with antiseptic precautions, and followed by necessary rest, bad results need never be expected.

"The congestive form may be treated in the same way, after purgation, rest, and local depletion, if the neurotic element also enters as a factor into the local condition."

As we find stenosis existing much oftener at the external than at the internal os uteri, it can readily be understood why sterility is far more frequent and persistent than dysmenorrhœa. When this is the case, the spermatic fluid can not effect an entrance into the os uteri, and this is often the cause of sterility. It is easier for the menstrual fluid to escape than for the spermatic fluid to enter. The galvanic current will overcome this condition. The negative pole in this case should be used in the os uteri, and the positive over the abdominal region, or over the ovarian, or over the fundus of the uterus, externally, according to the condition of the uterus and its appendages.

Continued sterility causes local disease, as catarrh, parenchyma-

tous congestion, displacements of the uterus, and finally sympathetic disorders of the ovaries. So vascular are these organs that they can not be subjected for years to the hurtful influences of oft-repeated, as well as the periodical, influx of blood, without a rest, and yet suffer no disturbances in circulation. The only rational treatment for these conditions is the galvanic current of electricity. The negative pole, which is the most active in its local dilating effect, should be chosen.

Treatment of Membranous Dysmenorrhoea.—This form is dependent on some morbid condition of the corporeal endometrium. Some writers recommend frequent dilatation and curettage. The writer has had the best results from the use of the galvanic current after curettage once only. The intra-uterine electrode should always be negative, because of its dilating effect. It should be used every third or fourth day, giving from fifteen to twenty milliamperes; seance, ten to fifteen minutes.

Sterility implies an inability for impregnation during normal reproductive life. Sterility is either relative or absolute. In the former condition there is diminished procreative power; in the latter, procreation is impossible.

Sterility is sometimes congenital, resulting from faulty development. It is said to be acquired when it arises from diseases, after an uncertain period of fertility.

Matthew Duncan says that one marriage in ten in Great Britain is sterile. In all probability the percentage is larger in the United States. Many women are childless these days in early married life from intentional causes, which is to be deplored.

A marriage may be unfruitful from causes pertaining to either the male or the female. More women are said to be sterile than men. The ratio is said to be six to one, though it may be less.

"Sterility," says Palmer, "exists, however, in men much oftener than is commonly supposed. Its greater frequency in women is easily understood, when it is remembered that the function of the male in reproduction ends with the discharge of the semen, but that the function of the female only begins then, and continues for a long time afterwards. If impregnation or fecundation occurs, some morbid action may interfere with gestation at any time in its course. Sterility, then, of course, follows. Fertility implies, therefore, normal fecundation and gestation."

This condition of the sterility of our race should be well considered in all its phases, and we implicitly trust that our American women will heed the advice given, and carefully study the causes of sterility in their case, if it exists, and guard against this evil, especially when it is brought on intentionally. If it is due to disease, resort to the best medical means for its removal, and persevere until it is overcome. You will get your reward for so doing.

Sterility in the female may arise from disability to perform coitus, as the semen must be deposited by the male within the genital

canal of the female. But if there is an imperfect development of the vagina, or atresia of the vagina, or an imperforate hymen, or vaginismus exists, impregnation becomes impossible. Most of the faulty developments of the external genital organs of the female may prevent coitus. Not infrequently the meatus urinarium is situated in a mere depression between the labia majora, and it is said that sexual intercourse has repeatedly taken place within the urethra. There may be a double vagina,—a partition between,—so that there may be stenosis; intromission is then impossible. The labia minora may be adherent through their whole length. Great hypertrophy of the labia or clitoris may result from tumors of some kind. The hymen may not only be tough and imperforate, but also greatly distensible. If it is perforate, although it impedes coitus, pregnancy may ensue, for a drop of semen that might pass into the vaginal tube may be sufficient to give rise to fecundation.

Vaginismus is a condition of the vulva orifice in which all attempts at coitus cause extreme pain. A digital examination, or the insertion of a vaginal tube, is attended with spasmodic condition. A vulvar or vaginal inflammation, an erosion, or a fissure about the curunculæ myrtiformei is usually at the bottom of the trouble. Sterility may ensue from painful coitus. The causes of dyspareunia (painful coitus) are manifold. Among them are vulvitis, vaginitis, milder form of vaginismus, rough attempts of the male at coitus, excessive sexual intercourse, lacerations of the cervix uteri, uterine inflammation, urethral caruncles, fissures of the rectum, painful hemorrhoids. As none of these prevent intromission or deposit of the semen within the vagina, they need not prevent impregnation. If sterility results from any of them, it is not because of the symptomatic dyspareunia, or painful coitus, but from the disorders themselves preventing impregnation or thwarting gestation.

Sterility may result from the semen not being able to enter the uterine cavity. Under these circumstances coitus may be painless and complete, but fecundation becomes impossible from atresia or stenosis of the external os uteri, and alterations in the quality and the quantity of the uterine discharge. A pin-hole os uteri externum, with a conoid cervix, is the most common of the congenital conditions creating sterility.

Uterine flexions and displacements are causes of sterility. Chronic endometritis, cervical catarrh, generally increases and alters the quality of the uterine discharges. The spermatozoids are washed away, and thus prevented from entering the uterine canal; their vitality must be impaired, which is one of the most common causes of sterility. The vitality of the sperm, it is said, may be destroyed by excessive acidity of the vaginal mucous. This condition exists mostly in married women after one or more children are borne, and constitutes a variety of acquired sterility. Any cause which prevents the entrance of healthy sperm within the uterine canal may prevent fecundation.

However, fertility may exist when seeming obstructions are found. Women vary greatly in their procreative power. Conception has been known to take place when the uterus was seriously diseased with cancer.

Sterility may result from an incapacity for proper ovulation. This cause is not so easily recognized as are the morbid conditions of the uterus, which may be detected by touch or sight. Chronic ovaritis comes under this head; and in some of its forms, such as perioophoritis and cystic degeneration, it impairs the ovule. Imperfect development of the ovule may also result from any general disability, as anæmia, scrofula, tuberculosis, or syphilis. Obese women are frequently found to be sterile, evidently from imperfect ovulation. A rich diet and a life of luxury and ease surely diminish fertility. A spare diet, with plenty of exercise and work, seems to favor it. Compare the wealthy with the poor. While the poor are very fertile, the rich, many of them, are childless.

Gonorrhœa, no matter how contracted, is a very common cause of sterility in women. It causes vulvitis, vaginitis, and inflammation of the vulvo-vaginal glands, with urethritis, and cystitis, and oophoritis. Gonorrhœa in either sex is a stubborn and long-continued disease. It has many complications in both sexes, but especially in women. In some cases, no doubt, it has an indefinite continuance; but cure is not by any means impossible.

Sterility may result from organic changes in the ovary or the fallopian tubes (hydro-, pyo-, or hæmato-salpinx), or from pelvic peritonitis, mechanically preventing an instinctive application of the fimbriæ to the ovaries.

Sterility may arise from inability to continue and complete gestation, which we so often meet with in cases of retroversion of the uterus. Although the sperm finds its way into the uterine canal, and fecundation takes place, or conception and gestation have occurred, still, for some reasons, fertility ceases, and abortion occurs early in gestation; and this is frequently the case.

It is said ninety per cent of all child-bearing women abort once or oftener, during their lives. One out of twelve pregnancies, end in an abortion.

Abortion may take place from fright, grief, traumatic causes, and from general disease. The causes are "paternal, maternal, and fœtal." Syphilis is a very common cause. Catarrhal and syphilitic inflammations prevent and arrest gestation. The development of the embryo depends very much on a normal condition of the decidua, and the healthy decidua depends very much on a healthy endometrium and a healthy womb.

There may be sexual incompatibility, from want of physical adaptation of the parties. A married life has existed for years; separation has been mutually agreed upon; and when either party obtained a new companion, fertility has been the result. Napoleon Bonaparte,

for instance, had no child by Josephine; a divorce followed in consequence; he married again, and became the father of a child by his second wife. Josephine was fertile by her first husband. This seems to show that there are some physiological differences in the spermatozoids or the ovules of different persons.

Consumption in either sex does not show diminished fertility.

Women very young in years have conceived long before puberty, while others advanced in years have been delivered long after menopause.

Conception has occurred after a rape, or when the female has been under the influence of an anæsthetic, or stupefied by alcohol or narcotics, and not infrequently when she is perfectly passive or disgusted with sexual intercourse.

Many women prolong lactation, or time of suckling, to prevent another pregnancy. However, lactation does not always prevent conception.

It is said: "The causes of sterility in the male are impotency, and also azoosperma, when the seminal fluids contain no spermatozoids, or only such as have feeble vitality. The microscope alone detects this condition, which is found in men sometimes who are otherwise in good health and normal vigor."

The diagnosis of the morbid condition producing sterility is of the utmost importance.

Success in the management of sterility depends very largely upon a correct diagnosis. At times all the means of diagnosis in both sexes may be required.

Prognosis is certain and favorable in some cases, uncertain and unfavorable in others, according to the conditions present.

The removal of the cause, if practicable, is the treatment. A correct diagnosis is required to determine as to whether the fault lies in the husband or in the wife. In all cases of long-continued sterility, after having thoroughly examined the wife, without finding a satisfactory cause for the sterility, the husband should be looked after in the same way. "Some of the semen may be obtained from the vagina of the wife, within a short time after coitus, for a microscopical examination. In case the cause is found with the husband, he should be treated for sterility, as it would be useless to treat the wife."

It is not the place here to speak of the treatment or management of sterility in the husband. It is necessary, however, for the wife to know that the cause of barrenness in her case is not always her fault, but often her husband's.

For barrenness in the woman we remove and correct, as best we can, all causes which impede coitus. An atresia of the vagina, an imperforate hymen, or a vaginismus is to be treated by appropriate methods, which are surgical means. If there is painful coitus from vulvitis, vaginitis, vulva-hyperæsthesia, endometritis, chronic metritis, chronic ovaritis, ovarian prolapse, displacements of the uterus, or a

diseased urethra, bladder, or rectum, all of these diseases need special treatment, care, and attention. The removal of these diseases may prolong life, make the life of the patient more comfortable, and especially enhance the chances for impregnation.

In case of displaced uterus or flexions, the organ is to be replaced and kept in position by the means of surgical procedure and vaginal tampons and properly-fitting pessaries. The pin-hole os uteri, or stenosis, is best overcome by the galvanic current, placing the cathode or negative in the ostium uteri, and the positive over the abdominal region. Give from fifteen to thirty milliamperes; seance from five to fifteen minutes, being always governed by the chronic condition of the cervix as to whether catarrh is complicating the trouble. Curettage may be resorted to in some cases of catarrh of the endometrium and cervix before commencing the use of the galvanic treatment. Dliation and curettage should be followed with an application of Churchill's tincture, after all bleeding has ceased, from washing out the uterus with a bichloride of mercury solution, 1 to 3,000, followed by rinsing with sterilized water; then apply the tincture as above mentioned, after which pack with sterilized gauze. Give a hot vaginal douche every day for a week, using an antiseptic. Rest in bed must be the rule. In two weeks after the curettage the galvanic current should be employed, and the treatment should be repeated every fourth day for a month. The patient may now rest from all local treatment except a warm douche at bedtime, as a hygienic measure.

Rare indulgence in sexual intercourse is said to favor fertility. Abstinence from coitus for months at a time is in some cases beneficial, not only by curing the disease which causes sterility, but also by increasing the chances of impregnation.

If the uterus is very small or illy developed, it may be stimulated to grow by means of the faradic current of electricity, provided the patient is young and otherwise healthy. The cathode uterine electrode is to be placed in the cervix uteri, and the anode, or positive, over the hypogastric region; give the strength that the patient can comfortably bear; seance from twenty to thirty minutes. The ovaries may also be treated by placing the cathode over the ovary and the anode over the small of the back, about the waist line, on the side of the spine corresponding to the ovary to be treated, whether the right or the left. Give from fifteen to twenty minutes' treatment over each ovary. This should be repeated daily, or three times a week, for several months, until a more normal condition results. A lacerated cervix calls for an operation.

The question is often asked, "When is impregnation most often likely to occur?" Fecundation may, in some cases, occur at any time during the month. It is most apt to occur within a week or ten days after the cessation of the menstrual flow, or it is likely to occur a day or two before the menstrual period. Undue frequency of coitus may cause abortion. Excessive acidity of the vagina may cause sterility.

This is corrected by the use of the vaginal douche, with a teaspoonful of borax to one quart of warm water. Use night and morning. Good tonics are of great value; tonics of iron, quinine, strychnine, arsenic, phosphorus, cod-liver oil, and the faradic current of electricity to tone up the nervous system—these improve the general health, and also favor fertility.

CHLOROSIS.

Chlorosis is a disorder of nutrition, a form of anæmeia characterized by an abnormal condition of the blood. It is not so common in the male as in the female. It is usually associated with a disturbance of menstruation, and very often it appears at the time of puberty, when the reproductive organs are developing. It is frequently a disorder resulting from illy feeding children. Special disorders of nutrition follow improper feeding, defective hygienic surroundings, overworked girls, as in schools, factories, and clerks. Chlorosis may also be due from lack of sufficient exercise in the open air, and from impure air and undue strain in mental exertions. It is met with in girls in upper classes of society and of good physical inheritance. There is always an anæmic state of the blood, the red blood-corpuscles being deficient in number and lacking richness in hæmoglobulin. In this disease the heart and blood-vessels are said to be usually small, but a compensatory hypertrophy of the heart may at times be present; there may be a defective growth of the ovaries and the uterus in chlorosis.

The symptoms are those of anæmia, as shortness of breath, palpitation of the heart, and a swooning away. The pulse is accelerated and easily excited; the complexion is peculiar, having a curious yellow-green color; hence the name "green-sickness." The appetite is variable and disordered, and there is indigestion and constipation. Menstruation is almost always deranged, and often hysterical. Amenorrhœa is very common. Menorrhagia is rare. It may be a constitutional disease, due to syphilis or some organic disease of the stomach or kidneys.

The treatment for chlorosis is iron, which is considered almost a specific. It should be given in moderate doses for a long time. The writer has found Gude's pepto-mangan of iron the best preparation of iron in these cases. J. Wyeth & Bros.' solution of iron peptonate and manganese is good. Dose for an adult, from one teaspoonful to one tablespoonful after meals, three times a day, in water, milk, or wine. There are other preparations of iron which are prescribed: The dried sulphate

℞: Ferri redactii pulv. ..... ʒ ij
Quiniæ sulphatis ..... ʒ ij
Acidi arseniasæ ..... gr. j
Ext. gentian ..... q. s.
M. et fiat massa pil, no xl.

Sig.: One pill after each meal, three times a day.

Tincture of nux vomica in one and two-drop doses, half an hour

before each meal, is always good in cases of chlorosis. The nux may be taken with hydrochloric acid.

℞: Tinct. nucis vomici.....ʒ jss
Acid hydrochloric.....ℨ j

M. et sig.: Five drops, half an hour before meals, in a small wine-glass of water, three times a day.

While medicines are being given, a strict attention should be paid to hygiene, diet, and exercise in the open air. The diet should be very nutritious. Eggs and milk are the best to enrich the blood quickly. Egg must be taken raw, beaten up with a pinch of salt, or taken with port wine, three times a day. Take one in the morning, another in the middle of the afternoon, and the third on going to bed. Milk and other nutritious foods should be eaten at regular meals. If the milk causes distress, flatulence, or indigestion, which is often the case, try taking it hot; and if it still causes distress in the stomach, malted milk may be taken. Harlock's is the best preparation. Beefsteak should be very tender; or the beef may be scraped and made into little cakes, cooked quickly on a hot griddle, and served while hot. It is easy of digestion, and is very palatable. Malt and cod-liver oil are useful in some cases, when there is struma, or consumption, or cancer in the blood. Exercise in the open air, taken freely as can be borne with comfort, is necessary.

CHAPTER VII.

DISEASES OF THE NERVOUS SYSTEM DEPENDENT UPON DISORDERS OF THE PELVIC ORGANS.

The various systems of the female economy are in intimate relations with the pelvic organs in health and disease. Chauncey D. Palmer, M. D., says: "Hystero-neuroses are phenomena simulating morbid conditions in an organ anatomically healthy, but due to morbid changes in the uterus and ovaries. Of these two, the uterus is usually the offending one. There is a sympathetic hyperæsthesia, due to reflex action, from uterine derangement. This is proved by the fact that these phenomena are intractable to treatment addressed to the symptoms, but are amenable to treatment directed to the causative pelvic disorder.

It is a matter of daily occurrence to witness the disorders of pregnancy. Almost as frequently we see the physiological changes from menstruation in the system at large, particularly at puberty and at the menopause. They are varied in character, as determined by ramifications of the ganglionic and spinal nerves and centers. When the organ receiving the impulse is in a state of lowered vitality and lessened resistance, or of hyperæsthesia, or when the nerve tracts are in a condition of morbid irritability, the reflexes are stimulated and heightened. Hence disorders of many parts of the body, the nervous system in particular, arise from functional or organic changes of the pelvic organs.

Excitability is a common property of all living parts, and is an essential condition of life. A great variety in the alterations, as regards seat, character, and intensity, renders it impossible to connect them at all times with symptoms of any definite kind.

Menstruation, in its systemic phenomena, modifies goitre, the diseases of the skin, varicose veins, fibroid tumors, and the circulatory changes of the brain in health and disease. The influence of disordered menstruation manifests itself in the brain as sleeplessness, melancholia, dementia, and mania; in other parts of the nervous system as local paralysis, epilepsy, and catalepsy; in the heart as palpitation; in the lungs as cough and dyspnea; in the stomach as nausea, vomiting, and indigestion; in the intestines as tympanitis and diarrhea; in the kidneys as hyper-secretion of the urine; in the skin as eczema and acne; in the breasts as disturbances of the lacteal secretions, pain, and localized enlargements; in the joints as pain, false anchyloses, etc. But for all practical purposes we may say that the resulting disorders of the nervous system partake of the nature of chorea, hysteria, epilepsy,

hystero-epilepsy, migraine, and neurasthenia. These, together with nymphomania, and other varieties of a sexually perverted appetite, as onanism and insanity, are especially referred to.

An irritation starts from the site of an organic lesion, and proceeds to the nerve cells at the base of the brain and the upper part of the spinal cord. Reflex action of the sympathetic nerves explains many of the diseases of women. Any irritation will travel on the line of least bodily resistance, and the degree of transmission depends also on the subject affected. Through this irritation the nerve-cells undergo alteration of their nutrition; after a time they acquire a morbid excitability, which is the essence of the disease. We may never know what cells are altered. The change in them may be more dynamical than physical. The microscope may be unable to detect any differences. No special lesion is constantly present. Recent pathology has taught us how serious distant diseases may be, started through reflex action and changes.

CHOREA.

Definition.—Chorea is a non-febrile disease, not necessarily dependent upon demonstrable organic affections of the nervous system, usually occurring in childhood, characterized by generalized choreic movements of nerve power.

Etiology.—"Neuropathic heredity, luxury, poverty, or whatever lessens the robustness of the nervous system of the child, predisposes to chorea. The disease is much rarer among negroes than among whites; it is more frequent among girls than boys; about four-fifths of the cases occur between the fifth and the fifteenth years."—Wood and Fitz.

Chorea, like other diseases connected with nervous exhaustion, is, in the northern United States, much more frequent in the spring, probably on account of the lowered nerve tone produced by the long winter. So large a proportion of the sufferers from chorea are of the rheumatic diathesis, and so frequently does chorea develop from or into rheumatism, or alternate with that disorder, that there must be some relation between the two affections. It is thought that chorea may be due to various poisons acting upon the nervous system, which is predisposed to the disease. Chorea might thus be defined as a peculiar condition of the whole nerve tract, capable of being produced by various poisons, and also by other disturbing agencies, such as violent emotions or anatomical alterations, the latter, perhaps, being due to widespread thrombosis. The action of these causes is favored by the existence of a peculiar predisposition of the nervous system to become choreic under their influence.

Chorea is prone to recur, not because one attack predisposes to another, but because a pre-existing foundation weakness renders the nervous system easily thrown off its balance.

It must be remembered, however, that chorea may be developed in a few minutes from fright, and is usually recovered from in a few weeks; hence it is said by some writers that it is absurd to suppose that it is necessarily based upon serious organic changes of the nerve-centers.

Since choreic movements may originate in either the brain or the spinal cord, and the condition of the knee-jerk in the choreic child demonstrates that the ganglionic cells of the cord are in an abnormal condition, it seems clear to the writer that the basal lesion of St. Vitus' dance is a change in the nutrition of the ganglionic structures of the whole cerebro-spinal axis.

In the chapter on children's diseases we will speak more fully on chorea, as it is a child's disease.

Pregnancy **is a very common cause of chorea,** when it is due to the violent and incessant movements of the fœtus, depriving the sufferer of sleep, and causing a rapidly-progressive exhaustion; and no time should be lost in bringing the patient under the influence of chloral and opium, aided by small doses of antipyrin, also the bromides.

The most important diagnostic symptoms of chorea are the rigidity and the tendency to rythmical movements in hysterical cases. In chorea the movements are incoherent, and devoid of character or rhythm. It consists in an exaggeration of those muscular movements which are constantly taking place, especially in children who have not yet acquired the power of governing the actions of their movements.

Treatment.—The treatment consists in removing any tangible cause. The food should be highly nutritious and of easy digestion. Fats are one of the essential elements in diet. Quiet and rest in bed, combined with nutritious food, do more good than medicines. Sea air and sea bathing are highly recommended. Added to these, the galvanic current of electricity aids in controlling the muscular twitching.

Moral treatment is important. Remove mental strain, control study, correct improper habits, and strengthen will power; all these are patent means to regulate the life of a choreic patient, and are always attended with good results.

Arsenic in small doses is useful. Cod-liver oil, when it agrees with the patient, is beneficial. Cimicifuga, strychnine, iron, and quinine are remedies that are used in choreic conditions.

HYSTERIA.

Hysteria is a functional disturbance of the nervous system, with much mental perversion. Most usually hysteria is confined to the female sex, but it is not always so limited. Hysteria is not dependent alone on uterine or ovarian diseases. When the disease presents itself in a female, there may not be any tangible evidence of any pelvic disorder. However, local affection of the genital organs has much to do toward provoking an attack. Hysteria is more common during pregnancy, and its symptoms are most liable to occur at the menstrual

periods. Erosion or lacerate cervix and chronic endometritis are responsible for attacks of hysteria. Dysmenorrhœa and mal-position of the uterus produce and perpetuate hysterical conditions in subjects predisposed to it by inheritance. Sedentary habits, idleness, vicious habits and practises, or any excessive development of the emotional nature, are also causes. Hysterical symptoms subside when the local causes or diseases are removed. Ovarian disease, also oophoralgia, ovaritis, and prolapsus of the ovaries, are causes of hysterical attacks. See chapter on hysterics in children.

Treatment.—The treatment is to deal with all cases according to all tangible causes, if practicable, and according to each individual idiosyncrasy. Always improve the appetite if it is poor; correct the indigestion; direct a regular nutritious diet; secure daily, normal alvine evacuations; open-air exercise to the extent of fatigue must be insisted on. Read wholesome literature only, as it supplies the best food for the mind. Cold baths are good in some cases; cool sea bathing is also valuable in many cases.

Anæmia and debility are to be treated with vegetable tonics and iron with cod-liver oil. Cimicifuga is a valuable remedy if there are menstrual derangements. Strychniæ is not so good, as it aggravates the disease. The use of alcohol and narcotics should always be avoided.

For the convulsions, when there is no doubt that they are due to hysteria, a sudden shock may be given to the nervous system by pouring cold water over the head and face, which is often followed by a return to consciousness, and a suggestion of its repetition may prevent another attack. Amyl-nitrate, a drop or two on a handkerchief applied to the nostrils, will quickly arrest the spasm or paroxysm of hysteria, or hystero-epilepsy. The bromides are the best remedies during the intervals between the attacks. Local paralysis is best managed with massage and electricity. Aphonia usually yields to the treatment of the galvanic current of electricity.

Disease of the uterus should be treated with the galvanic current, and all displacements corrected. Oftentimes friends and family are deleterious in their influence. In such cases change the surroundings. A visit away from home does much good. Excessive sympathy does as much harm as ridicule and abuse. Over-solicitude during an attack aggravates and prolongs it, as well as renders it more frequent. Gain the confidence of the patient, and arouse her to systematic exercise of her own will-power and self-control. General faradism is good in many cases.

Dr. Weir Mitchell's treatment of incontrollable hysterical patients is by seclusion, rest, forced feeding, massage, and electricity.

No doubt many cases of hysterics are due to walled-in exudate about the uterus, being due to peritonitis or inflammation of the cellular tissues, leaving an unabsorbed exudate having a boggy feel to the touch. The writer has recently had three cases where these patients were thus affected with hysterical attacks from this lesion. Rest in bed, nutri-

tious food, and the galvanic current of electricity, three seances a week, tonics of iron, quinine, cod-liver oil, port wine, and raw eggs, vaginal douches, saline laxatives, was their treatment; they were relieved.

Another form of hysterics results from a diseased condition of the fallopian tubes and ovaries. Some of these cases call for surgical operations. The record shows that operation does not always relieve the patient. Again and again have the attacks continued as bad as before the operation. Give general constitutional treatment, massage, tonics, open-air exercise, nutritious food, a change of scene, and general hygienic measures.

MIGRAINE, OR HEMICRANIA.

Definition.—A hereditary paroxysmal headache, without any obvious cause, usually appearing at puberty and gradually disappearing after the age of fifty.

Etiology.—The only known cause is heredity. We have no knowledge, it is said, of the basal nature of migraine. The paroxysms are described as being evidently of the nature of nerve-storm, which was thought by Trousseau to have a relation to epilepsy. There are said to have been cases in which migraine and epilepsy coexisted; others in which the two forms of paroxysms seem to replace each other. The best explanation of the rare cases is thought to be the coexistence of two neuroses. The relation, on the other hand, between migraine and gout seems very close.

Symptoms.—Migraine occurs in paroxysms which may be separated by a few hours or many months. The attack is usually preceded by malaise, chilliness, and a sense of languor, or more rarely by a condition of exhilaration. In most cases the pain commences in the forehead near the supra-orbital foramen, and gradually increases in intensity until it becomes unbearable. It is variously described by sufferers as boring, throbbing, or shooting pain, and it is sometimes situated in the occipital region. After a time, repeated vomiting occurs, with relief, which may be immediate or gradual. The whole paroxysm lasts from five hours to two or three days, and is often accompanied with intense intolerance to light and sound, and presents distinct hysterical manifestations. In some cases there is aphasia during the height of the paroxysm. Vomiting may be absent.

An attack may be ushered in by an aura, or a roaring in the ears; in most cases it takes the form of a disturbance of special sense. Rarely a peculiar bitter or a very disagreeable taste, or it may be a peculiar odor, marks the coming on of a paroxysm. The sounds are variously described as like that emitted from a marine shell applied to the ear, or a gurgling similar to that which is heard when water enters the ear during bathing.

An attack of migraine is usually attended with emotional depression, which may amount to a brief melancholy.

Diagnosis.—The diagnosis of migraine, usually easy from the history of the case, is to be confirmed by the exclusion of other causes of the attack and by a study of the family history.

Prognosis.—Migraine is said to be practically incurable, but abates after middle age, and is often ameliorated by treatment.

Treatment.—Treatment of migraine consists in the building up of the general health of the patient. The better the health, the fewer the attacks. Eye-strain must be carefully guarded against. The continuous administration of cannabis indica is often of great service in lessening the number and the severity of the fits of headache. "A known extract should be given in ascending doses until it produces mild symptoms of intoxication, and then a dose just within the limit of the full physiological dose should be administered, three times a day, for a month. Caffein, antipyrine, and antifebrine are often useful in alleviating the pain in migraine attack, and will in some persons abort a paroxysm." Of all palliatives the most certain is the combination of deodorized tincture of opium with potassium bromide. Ten minims with sixty grains may be given in two doses, in water, two hours apart.

The danger of forming the narcotic habit is never to be lost sight of in a disease so chronic as migraine.

A very efficacious combination is:—

℞: Zinci phosphidi.....grs. ij
Strychnine..... grs. ss
Ext. cannabi indicæ.....grs. x

M. et fiat massa in pil ulæ xx.

Sig.: One pill three times a day during the intervals.

Tincture of nux vomica can be given in doses of one drop every fifteen minutes to every half hour in cases attended with stomach disturbances; may give several doses if necessary.

Sodium salicylate, in doses of three grains every half hour, is sometimes very efficacious in gouty diathesis. Ammonium bromide and antipyrin form an excellent combination.

The bromides are admirably adapted to headache attended with cerebral irritability and excitability. They arrest functional activity of the brain, secure sleep, and diminish congestion. Brain weariness and exhaustion are most favorably influenced by caffein and guarana. Caffein is a powerful cerebral stimulant; it is also a heart tonic, increasing the arterial blood pressure. It is one of the best remedies that we have to increase absolutely the activity and the capacity of the human brain for work. Headache due to brain exhaustion and anæmia indicate its use.

Cannabis indica, given in doses of seven to ten drops every three hours, is one of the most trustworthy remedies for an attack of sick-headache. Its use is called for in cases associated with or dependent upon such menstrual disorders as menorrhagia and dysmenorrhœa. All cases are benefited by sitting up, and by being quiet in a dark room.

Cold to the head will do good in the paralytic form of the disease, and hot water in the spartic form.

Galvanism persistently used has produced good results. It is both prophylactic and curative. Almost every attack is relieved by it, but its successful employment must be based on scientific principles, keeping in mind that the current passes from the positive to the negative pole. Apply the anode or positive pole over the frontal region, and the cathode or negative pole to the lower cervical region, or between the shoulders over the spine. Give five to ten milliamperes; seance ten minutes. In case of paralysis the current should be reversed. The cathode is applied to the forehead, and the anode is placed in the hand. If the pain should be in the region of the temple, the positive should be placed over the seat of pain, and the negative pole in the hand corresponding to the right or left temple to be treated. Give from ten to twenty milliamperes. Seance ten minutes, over the seat of pain.

For nausea the anode is placed over the epigastric region, and the cathode in the hand. Give from thirty to fifty milliamperes. Seance ten minutes. Seance should be given daily until relieved; then about three times a week, for three months, when the patient may rest from the treatment.

NEURASTHENIA AND SPINAL IRRITATION.

"*Neurasthenia.*—This is a constitutional neurosis, which is due to deficiency or exhaustion of nerve force, or the lack of power of the nerve centers, not dependent upon the existence of organic disease in any part of the body."

Etiology.—Primary neurasthenia has, for its predisposing cause, an original feebleness of constitution of the nervous system. Spinal irritation, a local neurosis, is a symptom of spinal exhaustion. It may be produced by overwork, especially when this overwork is combined with emotional strain. Both of these conditions, especially the latter, are much more common in women than in men. Spinal irritation is most frequent in the higher classes of society, in women between fifteen and forty-five.

Symptoms.—Neurasthenia may be local or general. The development of general neurasthenia is very frequently preceded by a local neurasthenia. "This cerebral asthenia, the result of mental overwork, or a sexual spinal asthenia, the result of sexual excess, may exist by itself, but in most cases the local weakness is soon followed by a general neurasthenia. Usually neurasthenia develops slowly, but it may develop abruptly. The symptoms vary in accordance with the portion of the nervous system affected. They may be generalized as a loss of power of performing functional acts, associated with great irritability. Thus the loss of power of fixing attention, slight weakness of memory, disturbance of sleep, sense of weight and contractions in the head, ringing in the ears or head. We often hear neurasthenic

patients say that depression of spirits, great distress on mental effort, are the usual manifestations of a brain exhaustion, while failure of muscular power, of endurance, of sexual power, of vasomotor power, of control over circulation, results from weakness of the lower nerve centers."

Coccygodynia.—This is a distressing form of spinal irritation affecting the tip end of the spine, in the region of the coccyx. It often accompanies irritation of other portions of the spine.

The vasomotor symptoms are, excessive blushing on the least provocation or on the use of alcohol, cool extremities, occasional pallors, excessive sweating at night and during sleep, or during emotion or excitement. These are ordinary symptoms. The heart is often very irritable—palpitation, shortness of breath, and exaggerated increase of the pulse upon exertion being usually present. The patient is unequal to the ordinary routine of daily life. Everything to be done fatigues the brain; even to think of having it to do is fatiguing. Even talking and thinking are exhausting to the patient, who becomes subject to many morbid fears. Most all neurasthenics are easily agitated, very sensitive, and timid. They are usually spare in body, anæmic, broken down in health, and at times bedridden. There is predisposition to chorea and hysteria.

Neurasthenia has a great variety of causes. A bad inheritance in the way of temperament, lack of judicious physical exercise in youth, undue strain of the brain in study or occupation, social disappointment, business excitements and anxiety, and pelvic disease, are said to enter into the causation of this trouble. Female sexual disease, no doubt, is a direct cause. Any female disease which gives pain, frequent menstruation, or profuse leucorrhœa may soon bring about neurasthenia. Chronic uterine and ovarian diseases are liable to be responsible for this condition. Cervical tears almost always heal by second intention, and by the formation of some cicatricial tissue. They bring about erosions, eversions, granular degeneration, cystic degeneration, and chronic uterine catarrh. Pain is created, and reflex disturbances are set up. The morbid condition of the cervix uteri demonstrates in a greater degree these results of the varying susceptibility of the nervous system to pain and reflex irritability.

Treatment.—The rest cure, elaborated by Weir Mitchell, is most useful, and should be resorted to in the beginning of all female neurasthenics due to pelvic diseases or any uterine disease, combined with massage, seclusion for most cases, forced feeding, rest, and electricity. No one of these can be safely omitted. A tired brain is thus put to rest as the mind is diverted and not excited. Massage given once or twice a day gives the needed exercise to all parts of the body without exertion; sleep is secured; pelvic congestion is diminished by the recumbent position of the body. The circulation is equalized by massage. The nutrition is favored by forced feeding. Excretion is not neglected. The tonic effects of electricity are obtained by

the well-regulated administration of this agent. This special treatment, "rest cure," starts life anew. A complete transformation is often inaugurated, and all are benefited by it.

The Galvanic Current.—The positive pole should be active in cases of spinal irritation.

Some writers recommend the positive pole being placed to and below the region of the spinal tenderness, while the negative pole is placed at the sixth or seventh cervical vertebra.

The writer has used the positive pole over the seat of tenderness, where there is any enlargements or thickening of the cartilages, and the negative at some place below, or on the thigh. Seance from ten to twenty minutes, giving from forty to fifty milliamperes. In case of Pott's disease, the cathode is placed over the diseased vertebra, or over the seat of the lesion, and the positive over the chest. Give from twenty to thirty milliamperes; seance, ten minutes for each move of the poles. The galvanic current should be given daily, until pain and tenderness have ceased; then three seances a week, until the patient is considered cured. General faradization is especially useful in these cases; placed in the rectum it overcomes constipation. Arsenic is considered one of the best medicines; cod-liver oil, iron, and phosphorus are good. Arsenic is best for persons of the lymphatic or nervous temperament. Fairchild's Elixir of Calisaya Bark and Zinc Phosphite is highly recommended. Cod-liver oil, pure or emulsified with the syrup of lacto-phosphate of lime, is prescribed during the winter months.

Sufficient sleep is always to be secured by systemic muscular exercise in the open air, by a quiet life, and by early retiring to rest, aided by the administration of some easily digestible food, as beaten egg, or a glass of warm fresh milk, or a cup of hot malted milk (Harlock's). Wyeth's liquid malt is the best form of alcohol to be prescribed. Alcohol must be carefully prescribed.

In no class of disease is it more obvious than in this, that success in the management of the various neurasthenic conditions is largely in proportion to the degree in which the patient is won in confidence, thus stimulating her faith. Intelligent cooperation of all will be rewarded.

CHAPTER VIII.

INSANITY.

Definition.—Insanity is a mental condition of aberration sufficiently intense to overthrow the normal relations of the individual to his own thoughts and actions, so that he is no longer able to control them through the will, this condition being independent of known structural alterations of the brain. This definition does not include cases of mental aberrations which are commonly known in the court-room as insanities, but in which there is a distinct organic disease; in other words, it does not include the so-called organic or complicated cases of insanity.

The following I quote from Wood and Fitz: "Insanity is not a distinct disease, but an abnormal state, varying indefinitely in its intensity, and separated by no tangible line from sanity. Its manifestations are simply alterations, exaggerations, or perversions of the normal faculties, and therefore offer nothing that is absolutely distinctive. Emotional depression deepens into a pronounced melancholia; emotional exaltation lifts itself into the highest mania, by insensible gradations, and who shall say where the dividing line is between the state in which the man is master of the mood, and that in which the mood is master of the man? The insane, morbid impulse is but an exaggeration of what bids a man standing on the verge of some great height, to plunge headlong, or which, spreading from breast to breast, fills a mob with reckless rage, or scatters it in apparently causeless panic.

"Insanity being a symptomatic condition, and not a disease, it is incorrect to consider its different forms as distinct diseases; but for the purposes of discussion it is necessary to associate cases in symptom groups, to which names are given. The naming of these symptom groups has a distinct tendency to lead to the delusion that they are diseases, hence melancholia, mania, etc., are continually written about as though they were of equal rank with typhoid fever or scarlatina, whereas they are simply parallel groups to diarrhea, paralysis, or dropsy. They are not distinct diseases, as is shown by the facts; first, similar mental symptoms may be produced by various organic brain diseases, and that one organic brain disease will cause, or may cause, antagonistic forms of insanity; thus in paretic dementia, now there may be maniacal conditions, now a melancholic one. Second, not only does every grade of case exist in nature so that acute mania grades into acute melancholia without distinct lines of demarcation, cases not infrequently occurring which may with equal propriety be referred to

one or the other of these so-called diseases, but also in a single attack of insanity the form may change without appreciable cause, so that the patient to-day has mania and to-morrow melancholia.

"The insanities included in the definition given above are divided into, first, constitutional insanities; second, pure insanities."

Insanity is either of central or of reflex origin. For our present purposes all cases may be classified as follows: First, those which are purely central, from cerebral causes; second, those which are the result of female sexual disease, from reflex causes.

In this chapter we will speak only of cases which are purely reflex from pelvic causes. These cases are noticed about the age of puberty, after marriage, during and following parturition, and at the climacteric period. These times appear to be the periods of special susceptibility in women. At the same time we must remember that purely central conditions produce or arrest pelvic symptoms, and modify female pelvic functions. Mental derangements frequently disturb the functions of several organs of the body, or modify action, healthy or diseased, in them. Menstrual disturbances are said to be regarded as both cause and effect. The greater number of cases of insanity seem to arise from conditions and circumstances which depress and exhaust the nervous system. In many cases frequent child-bearing and miscarriages, with lactation, cause an excessive drain on the whole body. One of the most frequent causes of insanity in women is under such circumstances. At the menstrual period is the time women suffer mental depression, to a greater or lesser degree. Many cases of insanity, even not of reflex cause, are said to suffer worse at the catamenial periods.

We all recognize insanity at the menopause, called climacteric. The most common cause of amenorrhœa is impaired general nutrition. Most of the anæmic conditions favor menstrual suppression. Mental shock and prolonged anxiety so act. Insanity always impairs the general nutrition of the body, and disorders innervation, hence amenorrhœa is often the case in the insane. The general health must be built up, and the uterine functions restored.

The uterus and ovaries when diseased, in a patient of a highly sensitive organization, may cause mental derangement, which subsides only when the causative disease is overcome. The irritation and exhaustion from the pelvic disease may be the exciting cause of insanity, while the predisposing cause resides either in an altered or a deranged nervous system, or in some lesion of the brain, inherited or acquired. Sex, in reality, is said to be the predisposing cause of much insanity in women.

The relative frequency of insanity in the two sexes is a subject of much observation. Mental disorders are said to be more common in women than in men. More females than males are found in the asylums of our country, though more females than males recover from their first attack of mental aberration.

It is shown that fifty per cent of all cases of insanity in women arise during the discharge of the menstrual function. Depressing emotions, or shame and mental distress in the unmarried, vary in different cases, but the inherited or acquired neuropathic condition is fundamental. The exhaustion of nerve force brought about by anæmia in puerperal cases, from septic causes, is responsible for puerperal insanity. In these cases hereditary tendency is often traced. When it manifests itself early in pregnancy, it is considered reflex in many cases.

The menopause, or the change of life, is a most critical period of life in a woman's physical relations. At this period of woman's life we must not misapprehend the sexual manifestation of insanity. Symptoms should not be taken for causes. Perversions of the appetite are frequently among the premonitory symptoms of this disease, and are the essence of all mental aberrations, the sexual instinct being no exception to the rule.

From seventy to eighty per cent, according to statistics, of all cases of insanity are curable, if judicious treatment is instituted in the first month of the disorder. A longer duration than six months of the disease is attended by a rapid decrease in the rate of recoveries. Puerperal insanity furnishes a large per cent of recoveries.

Treatment.—As insanity is a disease of the whole nervous system, and as the entire physical organization, with every function of the body, becomes involved, the system at large must be treated. In all cases we are to recognize causes and circumstances depressing and exhausting the nervous system. There is no specific treatment.

Urgent symptoms, as constipation and insomnia, may first need attention. A good dose of calomel, followed in ten hours with Rochelle salts, is one of the most effective remedies to unload the alimentary canal in these cases. To secure sleep, the bromides and chloral hydrate produce the most natural. Hyoscin is serviceable, particularly when there is excessive motor irritability. When it secures sleep, this change indicates the first improvement in the disease. Exhaustion is to be guarded against.

In insanity dependent upon pelvic causes, and in fact in all cases of women, a careful inquiry is to be made in reference to existing pelvic symptoms and to signs of intra-pelvic affection. In all cases an examination should be made by a thorough gynæcologist, in the presence of witnesses. The patient may have to be put under an anesthesia before an intra-pelvic examination can be made. Chloroform or ether can be administered.

"The question is, Which disease started first? Which disease seems to be the cause? Is the case puerperal or climacteric? Does the mental aberration exist independently, or do the two diseases, the pelvic and the cerebral, hold any relationship? This examination involves inquiry as to age, the social relation, the menstrual function, and the existence of any organic sexual disease. Obscene talk

upon the part of the patient does not indicate the presence of such disease."

Dr. Shaw recommends the use of nitrous oxide gas for anesthesia in these cases. He is the medical director of Kings County Insane Asylum, Flatbrush. He has observed no unpleasant effects from its use.

Any pelvic disease which may be the immediate cause of the insanity, or the seeming cause, as endometritis, erosions of the cervix, chronic pelvic peritonitis, ovaritis, ovarian prolapse, cervical cicatrices with uterine displacements and neoplasms, should have special treatment. Every insane asylum should have on the staff a thorough gynæcologist, with experience, and broad, comprehensive views of the pathology and treatment of the insane.

The general management of cases with regard to diet, baths, stimulation, medication, how and when to restrain, if necessary, we will not mention, especially here, as there is no fixed, machine-like treatment adapted to all cases and conditions.

Treatment, therefore, must be adapted to cases, and the conditions and diathesis of each case thus affected, which the physician in attendance will conduct.

NYMPHOMANIA.

"Sexual feeling," says Maudsley (quoted from Keating), "is the foundation for the development of the social feeling." Professor Keating states upon this subject: "When the sexual feeling in the female is excessive or perverted, it is called nymphomania. This form of erotomania is a disease in the female like satyriasis in the male. There is mental perversion, always attended by uncontrollable sexual passion. To gratify the sexual appetite, in advanced and confirmed cases, all the decencies and proprieties of life are sacrificed. It is a delirium of lust, psychical desire engrafted on a markedly neurotic temperament, or a disease excited by impure reading or associations. The imagination calls up sexual images, which may lead to hallucinations and illusions. Nymphomania, in its most severe forms, is associated with, or dependent on, certain varieties of insanity, with or without gross brain disease. Although this disease is observed in children and in octogenarians, it occurs most frequently at the beginning or at the end of menstrual life. The genital organs are constantly in a state of turgescence. There is the greatest perversion of the sexual act, gratification being sought by the means of masturbation, etc. Thus certain diseases of the uterus and appendages give rise to nymphomania. The local exciting causes are intestinal, especially rectal, the presence of worms, hemorrhoids, inflammations of the urethra and bladder, and diabetic urine. Medicine, even cantharides, have very little, if any, such effect.

"Nymphomania may result from masturbation and sexual causes, as well as cause them. Some cases of nymphomania assume a periodic

form. Sometimes nymphomania is developed from a sudden cessation of normal coitus, in women of a highly erotic temperament."

Treatment.—The best results are obtained by moral suasion, by good and thorough occupation, by diversion, and by free physical exercise in the open air to the point of fatigue, unstimulating diet but very nutritious, early rising, cold bathing, regulation of the bowels, the use of salt-water enemas to remove rectum worms, followed with sulphur ointment inserted with a salve-injector into the rectum, once a day. Internal administration of the bromides are the best remedies. The galvanic current of electricity will relieve the turgescent condition of the genitals. The anode should be placed over the clitoris, and the negative over the sacrum, giving from fifteen to forty or more milliamperes, according to the endurance and the strength, little short of blistering. Seance from ten minutes to half an hour. This is indeed a valuable remedy in some cases.

The faradic current is not used at all in these cases. The writer has treated a few cases of nymphomania with satisfactory results, with the galvanic current. The anode is used in the cervix, in the vagina, in the rectum, over the clitoris, at or in the beginning of the treatment. It takes time and patience on the part of the operator. It is better to give two treatments a day at first, until the disease is placed under control. Place over the sacrum a broad flat zinc electrode, covered with eight or ten thicknesses of surgeon's lint; this is the cathode. Place a flat round electrode with a handle covered with at least ten thicknesses of surgeon's lint, having first placed over the clitoris a small piece of lint or a bit of absorbent cotton dipped in a twenty per cent solution of cocain, letting it remain during the seance. Place the anode on the clitoris, press very gently, but rather firmly, and turn on the current, ten milliamperes at first; in five minutes increase it to thirty, and gradually to fifty, and treat for at least twenty minutes. It will give great relief. On alternate days treat the uterus. The anode should be applied to the cervix, and the cathode over the sacrum. The hemorrhoids should be removed. Treat all local diseases. Marriage is contra-indicated until a cure has been effected. Removal of the ovaries has not given satisfactory results. Very hot vaginal douches, 130 degrees to 135 degrees Fahrenheit temperature, gives temporary relief, and aids in procuring sleep. Give from ten to twenty grains of bromide of sodium, at bedtime, after the hot vaginal douche has been given.

PERVERTED SEXUAL APPETITE.

Sexual perversion may be either acquired or congenital. It is congenital when it arises from defects in the sexual structure, as hermaphrodism, or from some defect in the cerebral structure, as in idiocy. It is acquired from pregnancy, the menopause, hysteria, ovarian disease, or through a stimulation of the nerves of sexual sensi-

bility from excesses or masturbation. It may be acquired from some cerebral disease. Heredity also constitutes an element in causation. Insanity is very frequently attended by perverted sexual impulses. These sensations may be due to some local disease. They are said to be cerebral in origin, existing when the former life has been pure, and when there is no local disease.

DYSPAREUNIA.

Dyspareunia generally denotes some disease of the vulva, vagina, uterus, ovaries, or parametric tissues. While disease of these parts generally causes dyspareunia, the opposite state, that of an abnormally strong appetite, may result from them. Sexual feelings unknown to women until after marriage, may be unduly stimulated.

Masturbation from erratic desires is sometimes practised by girls and women. When it is indulged in, it is, as a rule, the result of some local reflex irritation of the sexual or genito-urinary organs. Pruritus is a very frequent cause of masturbation in girls and women. The habit is formed from scratching, in very young girls. Rectum worms create an irritation favoring masturbation.

The writer had a patient, aged forty-six years, who had not menstruated for four months. Suddenly she awoke during the night with the most extreme desire for sexual intercourse; previous to this there had been no desire. The genital organs were in a turgescent state. Hot vaginal douches were administered, which gave relief for two or three hours, when the desire returned, causing an hysterical attack. Hot vaginal douches were administered every six hours; bromide of sodium in ten to twenty-grain doses was administered every three or four hours. The symptoms subsided, but the breasts became suddenly very painful and greatly swollen. The turgescent condition of the genital organs disappeared when the breasts began to enlarge. I inserted a carbon electrode into the vagina, up as near the left ovary as possible, it being the negative pole. I placed a flat zinc electrode two by three inches in size, covered with several thicknesses of surgeon's lint wet in warm water, over the left breast, corresponding with the negative on the left side in the vagina. The faradic current was turned on as strong as it could be borne, and the strength gradually increased as the current became less contractile, using the primary current of electricity. The seance was half an hour. Both breasts and ovaries were treated the same. In about ten or twelve hours after the faradic current had been thus applied, the menses appeared, and almost a uterine hemorrhage followed. The flow continued about three days, but not so freely as at the onset. All the symptoms of nymphomania subsided, the swelling in the breasts abated, and the menopause resulted. The symptoms never returned.

In case of dyspareunia, painful coitus, we must look for the cause. The writer had two cases, due to imperfectly ruptured hymen, which were relieved by clipping it in two or three places, and dressing with carbolized oil or vaseline. Misplaced uterus, vaginitis, etc., must be treated.

VAGINISMUS.

Vaginismus is an abnormal contraction of the muscles of the pelvic floor. Our first knowledge of this disease we owe to Marion Sims. It is considered not a disease, but a symptom of various morbid conditions of the vulva, the vagina, and the surrounding parts. The muscles that form the vagina are abnormally irritable, and reflex contraction occurs in them as a result of the following diseases: urethral carbuncle, vulvar inflammation, erosions, inflammation, and fissure of the hymen, with irritable caruncles, rectal fissures, cervical laceration, uterine displacements, as introversions and retroflexions, ovarian prolapsus, peri-uterine inflammations, and exudations. All these diseases are irritated by coitus, and painful coitus results from them.

Patients who are afflicted with the above diseases are always more or less irritable, hysterical, and are often sufferers from neuralgia, and easily depressed mentally. There is often a neurotic dysmenorrhœa. Vaginismus can be speedily relieved. Sometimes women suffer for days before applying to a physician for relief, through a sense of modesty.

Treatment.—All attempts at sexual intercourse must be prohibited until well of the disease.

To effect a cure, all local causes are to be removed. An inflamed hymen should be excised or exsected, after its being ruptured. The patient first having had a hot antiseptic vaginal douche, the caruncle myrtiformes are excised, and then dressed with sterilized zinc ointment and iodoform gauze, or plain sterilized gauze. Until well, the parts must be dressed antiseptically after each passage of urine. The hot antiseptic vaginal douche should be taken twice a day, and rest in bed is necessary to effect a speedy cure. Some writers recommend stitches to be taken after the caruncle myrtiformes are dissected away, and the parts dressed with iodoform or aristol, so that the healing may take place by primary intention.

Any irritable fissure of the anus must either be divided with the knife or thoroughly dilated under an anesthetic. Keep the anus dressed with sterilized linseed oil with a few drops of turpentine spirits in each ounce of the oil. This will soon heal the parts.

Vulvitis and vaginitis yield readily to hot antiseptic vaginal douches. Either use corrosive sublimate 1 to 3000, or carbolic acid 1 to 40, or sulphurous acid one dram to one and a half ounces of warm water, to wet the parts after having washed the vagina with a hot douche. Retain the sulphurous lotion for about five or more minutes, then apply sterilized vaseline with oxide of zinc, two drams of zinc to one ounce of vaseline. This ointment spread on antiseptic gauze, and placed around the uterus, and spread down the vaginal wall to the ostium-vaginæ, serves to keep the walls apart. This dressing should be removed every morning, and another dressing of the same applied, after, of course, a hot vaginal douche being given.

In chronic cases, where there are erosions of any of the diseased parts, a topical application of nitrate of silver, from ten to twenty grains to an ounce of water, administered once a day after the vaginal wash and followed with the oxide of zinc ointment dressing, will soon give relief. In some instances an application of a five to ten per cent solution of cocaine may have to be applied for eight or ten minutes before the vagina is dilated for treatment. It is better to use cocaine, so as to be able to treat the parts thoroughly for the first two or three times, after which the patient will be so much improved that treatments can be given without pain. The general health should be looked after. Tonics are useful in all the cases. Cod-liver oil should be given in cases where women are of consumptive tendencies.

Cervical lacerations belong to the care of a good gynæcologist. Displaced uterus, as retroversions and retroflexions, ovarian prolapsus, tumors, etc., belong to the domain of gynæcological surgery. We will not go into the details of the treatment of these diseases. However, the writer will say that she is opposed to oophorectomy, until all other means have been applied, as the galvanic current of electricity has relieved, and does relieve, ovarian diseases. Ovarian cysts and cancers call for an operation, but many fibroids are relieved by the use of the galvanic current. The cancerous growths of the uterus are not specially relieved from pain for any length of time. An operation is called for early in the course of the disease, or the patient may succumb early after an operation.

According to medical history, oophorectomy has been greatly abused. There has been mistaken diagnosis. This operation has been performed for hysteria, menstrual epilepsy, nymphomania, chorea, the various forms of insanity, dysmenorrhœa, and pelvic pains indescribable and ill-defined in character and position. The actual condition of the ovary, unfortunately, has not always been accurately determined. C. D. Palmer, M. D., contends that oophorectomy has been more abused than any other operation in the domain of gynæcological surgery, because resorted to for ill-defined symptoms which were not altogether dependent upon ovarian functional activity or disease. When there is no organic change in the ovaries, and has never been any, oophorectomy is almost always contra-indicated. Cystic changes in these organs are very common. We should not be deceived by their appearance. That a recovery follows oophorectomy, proves only that the patient has survived the operation; it does not prove that she has recovered from the disease for which the operation was performed. Hundreds, if not thousands, of women have had their ovaries needlessly sacrificed. Doleris, several years ago, said that in four out of five of all cases done in Paris, the operation was unnecessary. More careful consideration and a well-rounded treatment for women would save numbers of ovaries and tubes. Pain and dysmenorrhœa are not sufficient indications for female castration.

Many symptoms supposed to be due to organic changes in the ovary, are due to obscure perioophoritis or to ovarian neuralgia. Oophorectomy is a comparatively safe surgical procedure. When properly done, in selected cases, relief is sometimes very speedy; but in other cases, this may not be experienced for a year or more. Necessity is the only justification of ovarian extirpation.

CHAPTER IX.

THE FEMALE URETHRA AND ITS DISEASES.

Anatomy.—"The female urethra is about an inch and a half in length, and about a quarter of an inch in diameter, but very dilatable. It is widest at the neck of the bladder, narrowing as it passes through the sub-pubic fascia or triangular ligament in relation to the compressor urethral muscle. Its course is curved upwards and backwards from the meatus."

The urethra is separated from the vagina by an intermediate layer of cellular tissue.

The inferior opening of the urethra, the meatus-urinarius, is situated on the median line at the lower margin of the vestibule, its posterior or superior orifice at the neck of the bladder. The urethra, when at rest, is a closed tube.

URETHRITIS.

Simple urethritis is frequently met with. It may occur from a variety of causes. In a large number of cases it is gonorrhœal in origin.

SIMPLE URETHRITIS.

The irritating effects of concentrated urine, especially alkaline urine, is very frequently met with among women at or about the menopause. Septic vaginal discharge, or in case of gonorrhœa, chemical irritants, and mechanical injuries, catarrh of the bladder and urethra, are among the causes. Prolonged and unsatisfied sexual excitement will produce urethritis. In the specific form of gonorrhœal origin, the period of incubation is from two to five days.

Symptoms.—Urethritis usually begins with a slight chill in sensitive patients, but not always. For several days there is malaise, and moderate burning and tickling upon urinating. These symptoms are often overlooked. The prominent symptoms in the acute stage are painful urination. Scalding and burning caused by the passage of the urine over the inflamed surface of the urethral canal is complained of; there is a frequent desire to urinate, and often only a few drops of urine can be passed; sometimes a few drops of blood escape after micturition, or may pass with the urine. Hemorrhage from other portions of the urinary tract is usually more intimately mixed than when it proceeds from the urethra.

The milder form of urethritis, not septic or non-specific, usually runs its course in a few days. The gonorrhœal form lasts from five

to six weeks, the acute symptoms subsiding in from ten to fourteen days.

Diagnosis.—In acute urethritis, the meatus is swollen, reddened, and the urethral mucous membrane is a little prolapsed, exposing the inflamed orifice of the urethral glands. The urethra is felt, per vagina, as a firm cord, and tender to the touch. From pressure through the vagina upon the urethra from above downwards, a purulent fluid can be pressed out from the meatus. If the patient voids the urine, a portion of it into one vessel, and the remainder into another vessel, during the acute stage, cloudy urine will be found in the first vessel, clear urine in the second. Cloudiness of the second urine indicates cystitis.

In women gonorrhœal urethritis frequently passes into the chronic stage. Very frequently before urinating a drop of thin, milky mucopus may be pressed out of the urethra, per vagina, pressing from behind forward.

Treatment.—The treatment consists in rest, a non-stimulating diet, the use of alkaline drinks, hot vaginal douches, and saline laxatives. In the subacute and chronic stages, the oil of sandalwood, ten to five minims every four hours, to be taken on sugar or in capsules. It is a good plan to take it in flaxseed tea. A large wineglassful of the tea is a sufficient amount. Salol agrees with the patient sometimes better than the sandalwood. The dose of salol is five grains every three or four hours.

There are different opinions as to the proper time to begin washing out the bladder. Some writers recommend waiting until pain and smarting have nearly ceased. Others advise washing out the bladder at the onset of an acute case. This depends upon the general condition of the patient. Some patients are too nervous, and unable to bear pain, while others can bear sufficient pain to have the bladder washed out.

For urethral injections, Neiser, Guyon, and others employ injections of nitrate of silver, 1 to 4000, repeated from four to six times daily. During convalescence the frequency is reduced to once a day. "For the first few days after beginning this treatment," says Neisser, "the discharge is increased; it then becomes watery, and contains more epithelium, the gonococci rapidly disappearing. The injections are made when the bladder is moderately full, with an ordinary urethral syringe, a pipette, or Skene's reflux catheter, which is adapted to urethral irrigation. The bladder should always contain urine in order to prevent direct action of the injected fluid upon the wall of that organ." Irrigate the bladder with a warm solution of boracic acid, ten to twenty grains to the ounce, retain it a few minutes, and then let the patient void the bladder. Now apply a six per cent solution of cocaine to the urethral canal, through an endoscope or a urethral speculum, for about five or more minutes; then apply a solution of cupri-sulphas—ss gr. to the ounce of water—to the urethra. About three treatments in twenty-four hours is often enough to use the cupri-

sulphas. Hot vaginal douches are very necessary, to be given each time before the bladder is washed with the boracic solution; also let a stream of hot water pass over the urethra for a few minutes after the vaginal douche is administered. Oxide of zinc ointment, applied to the inner surfaces of the labia after the urethral treatment, is very soothing to the affected parts.

A milk diet is very essential in all cases of urethritis. One to two ounces of the infusion of buchu, with the sandalwood and flaxseed tea, is very useful in these cases.

STRICTURES OF THE URETHRA.

The treatment of stricture belongs to surgery. However, the galvanic current of electricity, the cathode being used in the urethral canal, will soon dissolve any cicatricial tissue. Seance once or twice a week. Cocaine the urethral canal, wash out the bladder with boracic-acid solution, ten to twenty grains to the ounce; then apply the galvanic current with a uterine electrode, or with a urethral electrode to fit the canal. The anode is placed in the vagina. Give from five to ten milliamperes. Seance three to five minutes; in some cases give ten minutes, according to the thickening of the urethral canal. The causes of cicatricial contraction are chronic urethritis, most frequently gonorrhœal; injuries during childbirth, and other forms of traumatisms; caustic applications, and syphilitic and tuberculosis ulcers. Atresia may arise from atrophy of the muscular coats of the urethra.

Symptoms.—Irritability of the bladder and dysuria are usually most prominent symptoms. Occasionally there is incontinence of the urine, or partial retention, which may give rise to cystitis.

Diagnosis.—Digital examination per vagina will reveal the thickened condition of the urethral canal. A sound passed into the urethra will reveal the extent of the stricture and the location. Any obstruction by pelvic neoplasms from pressure upon the urethra can be readily distinguished from cicatricial contraction.

Treatment.—Gradual dilatation, as practised in the stricture of the male urethra, which often demands surgical procedure.

PROLAPSE OF THE URETHRAL MUCOUS MEMBRANE.

Hoffmeir observes that this affection is most frequently met with in young debilitated women and children. It is said by writers that the process of eversion is usually a gradual one. Acute prolapse is, however, possible. The prolapse generally involves the entire margin of the meatus. In recent prolapse the surface of the tumor differs little in appearance from the normal mucous membrane. In long-standing cases the protruding mass may become dark, œdematous, fissured, eroded.

Hoffmeir mentions two cases which occurred in children seven and nine years of age. Sodermark has reported three cases, two of

which occurred in old women, aged fifty-eight and seventy years respectively. The third one was found in a child of nine years.

Etiology.—Age and debility favor its development. In children violent and prolonged coughing is regarded as the exciting cause.

Symptoms.—There is a straining sensation, or vesical tenesmus and dysuria are marked in proportion to the degree of the obstruction and the sensitiveness and the irritability of the urethra and the displaced structures. Soreness and pain are increased on walking, and coitus is frequently painful. Pain, however, is not always present, especially in children.

Diagnosis.—When the displaced mucous membrane is not too much strangulated and swollen, mere prolapse may be distinguished from new growth by the fact that it may be replaced. Again, urethral prolapse generally appears as a circular protrusion, with a central opening. The tumor is a less vivid color, is less prone to bleed, and is less sensitive to the touch than a caruncle.

Treatment.—In recent cases, and in others in which the prolapsed structures are in a comparatively healthy condition, simple measures may be tried. The protruding mass should be replaced, after reducing the swelling by the application of hot water or ice. After repositing the redundant mucous membrane, retraction of the urethral canal is to be promoted by the use of suitable applications, such as touching daily with a two per cent carbolic acid solution or a dilute tincture of iodine. Tannic acid bougies, weak solution of persulphate of iron, or other astringent remedies, may be tried. Meantime the patient must be left in a recumbent posture, and care used to guard against a recurrence of the prolapse during micturition. Vesical or rectal tenesmus or straining, so far as possible, must be relieved. The bladder should be examined for stone or vesical tumors. If these means fail to relieve the condition, more active measures will have to be resorted to. Some writers (Jewet and Pollok) have succeeded with linear cauterization of the prolapsed membranes. Erosion of the redundant tissue is frequently necessary. A good gynæcologist should have the care of these cases.

VESICO-URETHRAL FISSURE.

"Skene says that this lesion is by no means infrequently met with in the female. About two-thirds of the fissure is located in the urethra, while only the upper portion extends into the vesical neck; yet the entire lesion is within the grasp of the sphincter-vaginæ, in the majority of cases, and is then a potent cause of irritable bladder, which may often pass unrecognized by the physician. The cause may probably lie in a previous urethritis. Injuries during childbirth favor development of urethral fissures."

Symptoms.—The symptoms depend upon its site. Occurring, as it does, at the union of the bladder and the urethra, and because of the

constant slight pressure of sphincteric contraction, the pain is continuous and severe. The upper portion of the fissure, which extends into the bladder, is exposed to the irritation of the urine, and excites a constant burning pain at the neck of the bladder. Pain is most severe during and after urination, and the patient strains to empty the bladder. Occasionally a few drops of blood escape at the end of micturition. The pain varies in degree, in some cases being intense when the urine is highly acid, and less severe when it is neutral or alkaline.

Diagnosis.—Pressure with the fingers upon the neck of the bladder and posterior urethra produces a sensation as though a knife were piercing the part.

The symptoms of cystitis and urethritis very closely simulate those of urethro-vesical fissure. In fissure, the pain is acute and circumscribed, while in cystitis it is diffuse and frequently extends over the body of the bladder. In cystitis a sense of relief soon follows micturition, in urethritis the greatest pain occurs during micturition, and subsides shortly after the bladder is emptied. Examination of the urine will exclude cystitis, while the presence of fissure can be detected and urethritis excluded by careful endoscopic examination. In a majority of cases observed by Skene, he has found the fissure on the right side of the neck of the bladder anteriorly. He states: "Through the endoscope, with the parts on the stretch, it appears as freshly torn and bleeding, from one-fourth to one-half inch in length, and from one-twelfth to one-sixth inch in width, tapering toward the ends. The deepest part has a gray color, like an indolent ulcer, while the edges appear actively inflamed."

Treatment.—This is considered one of the most troublesome affections of the urinary tract which the surgeon is called upon to treat.

Skene recommends touching the fissure with galvano-cautery. The knife and argent nitrate in the mitigated stick are applied by drawing them through the ulcer in a similar manner as through the fenestra of the endoscope.

When these methods fail, the establishment of a vesico-vaginal fistula, placing the fissure at rest, offers the only chance of recovery.

URETHROCELE.

The etiology of urethrocele is not settled. Injuries at childbirth are seemingly responsible for this condition met with in women, as it is most commonly met with in women who have borne children. According to English, the divertular form results from the rupture of a congenital cyst of the urethral wall into the urethral canal.

Symptoms.—The symptoms of urethrocele are for the most part due, directly or indirectly, to the retention of a certain amount of urine in the sac. The residual urine becomes ammoniacal by decomposition, and finally purulent. The sac wall becomes inflamed and eroded.

The ammoniacal urine will cause cystitis, also urethritis. Cystitis sometimes results from extension into the bladder. In many cases decomposed urine is expelled from the sac by sneezing or coughing or laughing, or any sudden muscular effort, giving rise to severe and troublesome excoriations of the surrounding external surfaces. There is frequent desire to urinate, and urination is painful.

Diagnosis.—To examine per vagina, the sac is perceptible to the touch, and to ocular inspection of the anterior vaginal wall. When the pouch is of large size, it protrudes from the vulva. The retention of the urine may be demonstrated by drawing it off with a catheter. Under pressure with the finger the sac collapses, and the contents ooze from the meatus. The passing of a curved sound into the pocket per urethram demonstrates the existence of the sac or pouch.

Skene advises operation by making a fistulous opening, the whole sac being excised. The fistula may be closed after the parts have been treated and restored to a normal condition. If cystitis is present, it is to be treated as in other cases. In some cases of urethrocele Skene advises dilating the lower part of the urethra, and supporting the sacculated portion either with a pessary or with a tampon, together with the use of the usual topical applications.

URETHRAL DISLOCATIONS.

The only urethral dislocations of importance are the downward displacements. Upward dislocation is said, as a rule, to give no symptoms, save the diffiulty in passing the catheter. In downward displacements varying degrees of suffering are complained of by the patient. The displacement may be partial or complete. In partial dislocation downward the upper two-thirds of the urethra is prolapsed, that portion of the canal having a backward instead of an upward direction. When the prolapse is complete, the bladder appears at the vulva, with the urethra protruding between the labia minora.

Etiology.—Downward dislocation of the urethra is associated with prolapse of the anterior wall of the vagina. These conditions are almost uniformly the result of injuries during childbirth, sagging of the anterior vaginal wall occurring in perineal lacerations, involving the levator-ani muscles. The bladder, or the upper portion of the urethra, is then permitted to fall below its normal position.

Symptoms.—In minor degrees of displacement there is vesical irritability and partial loss of control of the bladder; urine escapes on coughing, sneezing, or laughing. In extreme displacements this unpleasant condition or symptom is absent. The sharp bend in the urethra prevents incontinence, and difficult urination is the rule. The severity of the symptom is much relieved by the recumbent position.

Diagnosis.—The diagnosis is easily made by a digital examination per vaginam, or by inspection with or without the aid of a speculum.

Treatment.—Perineal injuries should be repaired. Temporary relief, with some degree of permanent benefit, may be gained by the

use of vaginal tampons, or the use of a pessary so constructed as to support the entire prolapsed wall or portion of the urethra.

FISTULAE.

"Urethral fistulæ may be complete or incomplete; both forms are of rare occurrence."

Complete fistula opens into the vagina. Fistulas result from injuries during childbirth. They give rise to comparatively little inconvenience, as the urine passes through the fistula only during micturition.

Incomplete urethral fistula is an opening leading from the urethra into the urethro-vaginal septum, and ending in a blind extremity. A peri-urethral abscess rupturing into the urethra may leave such a fistulous tract.

Diagnosis.—Pain during urination and a sense of heat in the urethra are common symptoms. A blind fistula in the posterior portion of the canal, in the vicinity of the vesical neck, gives rise to a frequent micturition and tenesmus, or straining. Pus may at times ooze from the urethra. Smarting during and for some time after urination is almost always present.

Treatment.—The fistula should be closed by means of operative procedure. The fistula is first made complete and the edge of the wound carefully denuded. The urethra and the fistulous tract are then to be kept clean by injections into the urethra of a solution of boric acid, or some other equally bland antiseptic. The urine is drawn with a catheter, to prevent irritating the wound. Then the urethro-vaginal fistula may close of its own accord, or it can readily be closed by the usual operative procedure.

URETHRAL TUMORS.

Caruncle.—Caruncle is a small, raspberry-like growth at the external orifice of the urethra. It is situated, most usually, at the inferior or posterior portion of the meatus, though it may spring from any part of the circumference. In exceptional cases its location is above the orifice within the canal. These growths vary in size from that of a pin-head to that of a split pea, and are usually single, though occasionally multiple. They consist of hypertrophied papillæ, and are extremely vascular and abundantly supplied with nerve filaments.

Symptoms.—The most prominent symptoms of urethral caruncle are great sensitiveness to touch, and often extreme pain during micturition. The severity of the symptoms seems to be out of proportion to the apparent importance of the lesion. Sexual intercourse is very painful, often impossible, owing to the reflex spasm of the levator-ani muscle. There is irritation of the bladder, giving rise to a frequent desire to urinate and to vesical spasm. In extreme cases cystitis may result. There is usually more or less hemorrhage from the tumor. This affection of the urinary tract gives rise to more serious injury to

the general health. In neglected cases the nervous system is shattered by pain and loss of sleep, and the patient is reduced to a condition of chronic invalidism.

Diagnosis.—Caruncle must be distinguished from urethral polypi and from prolapse of the urethral mucous membrane. A polypus is usually attached by a slender pedicle, "while in papillary angioma the growth is sessile." The former lacks the sensitiveness of the latter. In prolapse the protrusion is circular, with the urethral orifice at its center, while caruncle springs from a portion only of the circumference. The vascular tumor can not be reduced. Angiomata, affecting the deeper portions of the urethra, may be differentiated from other urethral tumors by their sensitiveness to touch with the probe, or to the pressure of the fingers through the urethro-vaginal septum.

VARICES.

Varicose veins appear as a bundle of irregular, distended, dark-blue, or bluish-red vessels, most frequently occupying the urethral floor.

GLANDULAR NEOPLASMS.

Urethral cysts may be located in any point in the canal. In early life they occur in the meatal portion, later, near the vesical neck. Their origin is due, for the most part, to occlusion of the orifice of urethral glands. These small cysts are transformed into polypi by the absorption of their contents.

FIBROMA AND SARCOMA.

The former, as a rule, lies embedded in the muscular wall of the urethra. It is frequently peduncular, and protrudes from the meatus. In size fibromata vary from the bulk of a pea to that of a goose-egg.

Sarcoma of the urethra is so seldom met with that its mere mention in this connection will suffice.

CARCINOMA AND EPITHELIOMA.

The existence of primary cancer of the urethra is very rare. It is less frequent in the female than in the male.

POLYPUS.

True polypus is a rare occurrence. It springs from a high point up in the urethral canal. Polypi are not painful, but cause obstruction to micturition.

Treatment of Caruncle.—The chemical caustics are unsatisfactory. The growth, as a rule, soon returns. Complete extirpation is the treatment for permanent relief. This is done by extirpating the growth with actual cautery. Some operators excise the diseased structures and stitch the edges of the healthy mucous membranes of the urethra together. Skene recommends the use of the galvano-cautery, as fol-

lows: "The neoplasm or caruncle is seized by a narrow-bladed forceps at the junction of the normal and abnormal tissues; the forceps are closed and locked, and the caruncle cut off. The cautery is then applied to the forceps sufficiently to heat hot enough to desiccate but not char the tissues held in their grasp. This being accomplished, the forceps are carefully removed, by first unlocking, then rocking them gently, so as not to pull the pedicle or stump apart and start bleeding. If the work is well done, the thin stump of desiccated tissue will project on the surface of the mucous membrane. The bladder should be emptied before operation, so that there will be no necessity to urinate for five or six hours after. This lessens the danger of reopening the stump; and usually but a small linear surface is left to heal by granulation after the eschar sloughs. Applications of sterilized vaseline help to protect the stump while healing."

When a neoplasm or caruncle arises from Skene's glands, which are two glandular tubes situated just within the external orifice of the urethra, which were first discovered by Skene, he says: "Upon each side, near the floor of the female urethra, there are two tubules large enough to admit a No. 1 probe of French scale. They extend from the meatus-urinarium upward, from three-eighths of an inch to three-fourths of an inch, running parallel with the long axis of the canal. They are located beneath the mucous membrane, in the muscular walls of the urethra. The mouths of these tubules are found upon the free surface of the mucosa, within the labia of the meatus-urinarius."

For these glands (Skene's) the best method of treatment is to pass a fine probe up into the canal, and cut down upon it with a fine cautery point from the vaginal surface. In other words, lay the ducts of the glands open. This divides the neoplasm on one side, and an incision should be made with the cautery on the opposite side, which divides the growth into two equal parts, when each part is grasped with the forceps, and removed as already described.

Treatment of Other Urethral Tumors.—Tumors of a broad base are readily removed by the ligature. The growth being exposed and drawn into reach with a pair of forceps, the base is transfixed with a needle from without inward, in a direction parallel to the axis of the canal; a ligature is then thrown around the base beneath the transfixed needle, traction being made upon the tumor with the forceps to bring the sides of the base into the grasp of the ligature, which is then tied tightly, care being taken to prevent cutting the tissues in the ligature. Torsion, or twisting, is also applicable in pedunculated neoplasms. The base of the pedicle is seized with small, thin-pointed forceps, and the growth is twisted off with an ordinary pair of nasal forceps; then, as a preventive against hemorrhage, touch the stump of the pedicle with the galvano-cautery.

The Germans employ the curette for the removal of growths high up in the urethra. After they curette, the site of the tumor is to be

dried up and seared with the cautery. Skene uses a polypus snare for the removal of growths high up in the canal.

The galvanic current of electricity applied to the stump of the neoplasms after removal acts beneficially. Cocaine the pedicle, place several thicknesses of surgeon's lint, about three-fourths of an inch in width, dipped into some kind of bland antiseptic solution, over the pedicle; then place the anode of the proper size on the lint, and place the cathode over the hypogastric region. Give from ten to twenty milliamperes for twenty minutes, which will prevent bleeding and hasten the absorption of the pedicle. The first application of galvanism is made the third day after the neoplasm or polyp has been removed. An ointment of sterilized vaseline, with iodoform or oxide of zinc ointment, is used for dressing.

The writer has successfully removed neoplasms with an electric needle. The anode is used at the base of the caruncle, or neoplasm, and the cathode is applied through the apex, or on the top, just underneath the second layer of the mucous membrane. Cocaine, ten to twenty per cent solution, is applied until the affected part can be punctured without pain; then the neoplasm is grasped with forceps, and the platinum needle is passed through the base, or just barely underneath the base, of the growth, while from time to time cocaine is being dropped on the parts being treated. The forceps are now removed, and the needle attached to the negative pole and passed through the apex. The current is turned on very slowly, until the pathological sign is visible, that is, when the neoplasm at the base begins to have a blanched appearance. Sometimes five to ten milliamperes are sufficient, according to the age and size of the caruncle, and whether it is of a complicated nature; in the latter case it may take fifteen to twenty milliamperes. As soon as the mucous membrane shows a blanched appearance, the current is sufficiently strong to destroy the growth, and this must be the guide to determine the number of milliamperes to be given. Give from a half minute to a minute; now reverse the current for a few moments, and remove the needle. Apply the needle on the opposite side the same as the first. Treat every portion of the caruncle until every blood-vessel has a congealed and blanched appearance. This must be done with care and judgment, that it may not be overdone. After the seance apply sterilized vaseline. When the patient voids the bladder, the parts must be washed with clean boiled water, and the dressing of the vaseline applied. Usually one treatment thus given is all that is necessary for the removal of the growth. It usually takes two or three weeks for the neoplasm to disappear after the treatment. The patient should rest in bed for at least three days after the galvanic treatment. Very often, however, patients will not rest at all after the treatment, as they feel no inconvenience from it. When they will not rest, but keep on their feet as usual, a second treatment may have to be given, and it is well to make known the fact.

FOREIGN BODIES IN THE URETHRA.

Foreign bodies of various descriptions may find lodgment in the urethra.

Partial retention of the urine is the chief symptom. It may be a stone lodged in the urethra, or it may be from a wound.

Diagnosis.—Diagnosis is made through the vagina, with the index finger, while examining the urethra.

Treatment.—"Treatment is by extracting the foreign substance with a pair of long, thin-bladed forceps. The body is held in place by the finger in the vagina, pressed against the urethra at a point immediately behind the body during the attempt to engage it in the forceps. Sometimes a wire loop or a smooth curette is used for the purpose of removing foreign bodies from the urethra. If this be impracticable, incision of the urethra at the point of obstruction may have to be resorted to."

CHAPTER X.

DISEASES OF THE BLADDER.

Anatomy.—The ligaments of the bladder, which are found by the reflections of the peritoneus and the expansions of the pelvic fascia, are of the greatest importance, as they serve to maintain the position of the neck of the bladder. The bladder is a hollow, muscular organ. When empty, or moderately filled, it lies entirely below the plane of the pelvic brim, between the pubic bones in front and the vagina behind. In the infant it is an abdominal organ, and is somewhat pear shaped. In old age there is a partial return to infantile conditions. When the bladder is overdistended, it rises above the line of the pubic bones, and is seen as a mesial projection above the symphysis. In extreme cases it may reach the umbilicus, it being more distensible in the female than in the male.

The bladder has three openings,—the ostrum urethra-internum and the two ureteric orifices. The ureteric orifices are situated one on each side of the median line, on the floor of the bladder, about three centimeters behind the vesical opening of the urethra, and the same distance apart. A transverse band stretching from one side to the other is known as the inter-uteric ligament.

Kelley says: "The appearances of the urethral orifice differ in different cases. It sometimes appears as a dimple, or as a fine slit in the mucous membrane; at other times as a V, with the point directed outwards. Again, it may present the form of a truncated cone, with gently sloping sides, the urethral mons."

The regional divisions of the bladder are "the apex, or summit; the base, or inferior fundus; and the so-called neck." The summit of the bladder is upward and forward, and is attached to the urachus. The base is the part which looks downward and backward. The trigon is a triangular space at the base of the bladder, whose apex is at the urethral orifice, and whose base is in the interior line. Over this the mucous membrane is thinner and more closely adherent, having no sub-mucous layers. The nerve supply to this space is very abundant, and it is accordingly the most sensitive area of the bladder. The apex of the trigon, where it merges into the urethra, is the so-called vesical neck. In that part of the base which lies just behind the inter-uteric line is a slight depression, the bas-fond, which in old age becomes a deep pouch holding residual urine.

The more important anatomical relations of the bladder are of a clinical interest. In the erect posture the anterior inferior surface

looks toward the symphysis. It is separated from the pubic bones by a space known as the cavum Retzii. This space contains a variable quantity of loose fat. Each lateral surface is partially covered with peritoneum. The posterior surface is intimately connected below the cervix-uteri, and to the upper part of the anterior wall of the vagina, but is separated above from the body of the uterus by the shallow fold of the peritoneum, the utero-vesical pouch. The superior surface lies in contact with the small intestines, sometimes also with a portion of the sigmoid flexure and with the appendix vermiformis.

The ligaments of the bladder are five false and five true ligaments. The false ligaments are formed of folds of peritoneum; this is reflected from the inner face of the anterior abdominal wall at a point just above the symphysis to the bladder, investing that organ, as has already been shown, superiorly, laterally, and, in part, posteriorly. It joins the bladder in front, dipping down over the superior vesical surface, and passes as far backward as the point of contact between the vesical base and the uterus at the junction of the uterine body and cervix. The superior peritoneal fold in front, which extends from the summit of the bladder to the umbilicus, covering the urachus, two utero-vesical folds, and two lateral folds of peritoneum, constitutes the false ligaments. The true ligaments of the bladder are superior (the urachus), two lateral, two vesico-pubic, the last four being formed at the recto-vesical fascia.

The bladder has three coats, a mucous, a muscular, and, over a part of its surface, a serous or peritoneal coat, the relation of which to the viscus has already been described. The muscular coat consists of three layers, but the innermost is incomplete. The fibers run, for the most part, in longitudinal and in circular directions; at the neck the circular fibers are collected into a layer of some thickness, which immediately surrounds the upper end of the urethra, forming the so-called sphincter-vesicæ of some writers. The mucous membrane is lined by transition-stratified epithelium, and is arranged in irregular folds. Throughout the mucous membrane are minute glands and follicles.

The vascular supply of the bladder is derived from the superior, middle, and inferior vesical arteries, and from branches of the uterine, internal, pubic, hemorrhoidal, and sciatica. The veins form tortuous plexus about the base, sides, and neck, and finally empty into the internal iliac veins. The lymphatic distributions in the submucous cellular tissues of the bladder are quite extensive, the lymphatic vessels emptying into the hypogastric glands.

The nerves of the bladder are derived from the third, fourth, and, in rare cases, the second sacral nerves of the spinal system, and from the hypogastric plexus of the sympathetic. The latter plexus is situated in front of the last lumbar and first sacral vertebræ. The branches of the spinal nerves go mainly to the base, and not to the neck, of the bladder.

MALFORMATIONS OF THE BLADDER.

Congenital defects of the bladder, though of great variety, are of rare occurrence.

Fissure of the bladder is the most common congenital defect of that organ. It is said to be far more frequent in the male than in the female subject, eighty to ninety per cent of such cases occurring in the former sex. It is associated with partial failure in the closure of the ventral-laminæ. It consists in a cleft, often the entire absence of the anterior wall of the bladder, and a median fissure of the anterior abdominal wall. Like other anomalies of development, it is rarely single. Frequently the urethra and the vagina are absent. Malformations of the vagina or uterus and developmental defects of other pelvic organs, and even harelip and spina bifida, are not uncommonly found associated with this anomaly. The ventrical cleft may be limited to the region of the umbilicus, to the symphysis, or may involve the entire inferior half of the anterior abdominal parietes. When the ventral fissure is situated near the umbilicus, the pubic symphysis is closed, and the urethra, the inferior portion of the bladder, and the external sexual organs are normally developed. Fissure limited to the lower part of the bladder, or the corresponding part of the pelvis, is very seldom found.

When the malformation involves the lower portion of the abdominal parietes, there is usually separation of the pubic bones, the clitoris is cleft or undeveloped, the urethra, and possibly the vagina, are absent. The posterior bladder wall is pushed forward, and protrudes into the abdominal wall. The latter condition is known as exstrophy of the bladder. The exposed mucous membrane is inflamed and swollen. The urethral orifice is usually exposed to view. The ureters are generally enlarged, sometimes having a diameter of two, or even eight or ten, centimeters, and their pelvic course and relations are altered. The exposed vesical mucosa of the posterior wall may take on, to some extent, the appearance of the epidermis. The urethra is either impervious or, more frequently, entirely absent.

"Treatment of exstrophy of the bladder is surgical. All devices thus far proposed for collecting the urine are useless."

FUNCTIONAL DERANGEMENTS OF THE BLADDER.

The causes are various. The local disorder may be one of the manifestations of a general neurosis. In hysterical, nervous women we meet with what is termed irritable bladder, which is so often a symptom of disease in other organs. Frequent urinating, incontinence, and spasmodic retention are often seen in this class of patients, from no other cause than disordered innervation. Any influence which acts to depress or excite the nervous system may be a contributing factor. Vesical irritability is no doubt frequently a result of abuse of the sexual functions.

Violent emotional disturbances are sometimes attended with loss of control over the vesical sphincter. This is illustrated in the occasional effect of severe fright. Examples of the extent to which mental influences may affect the bladder are the refusal of the sphincter to relax in the presence of another, and of the opposite effect of the sound of running water.

Reflex vesical disorders in many instances are due to urethral caruncles, polypi, strictures, tumors, and other diseases, which may be the source of the vesical irritation.

Painful affection of the vagina and urethral diseases act in a like manner. Fissure of the anus, hemorrhoids, stricture of the lower part of the rectum, ascarides, and other causes of rectal irritation, are commonly-recognized sources of retention and other disturbances. Inflammatory diseases of the uterus, tubes, ovaries, or pelvic peritoneum frequently give rise to irritable bladder. Painful irritability is often observed after abdominal operations in which the adjacent viscera have been concerned. Greatly increased or diminished density of the urine makes it irritating to the bladder; so also does hyperacidity and alkalinity.

Mechanical disturbances, as cystocele, the traction of a misplaced uterus upon the vesical neck, or of a tumor to which the bladder is attached by adhesions, pressure of a gravid or pregnant uterus, or a pelvic neoplasm, are potent causes of vesical disturbance or irritable bladder.

Symptoms.—The symptoms resemble those of cystitis. There is dull pain and a sense of weight in the region of the pubes, often increased on standing or walking. The pain is felt most at the vesical base and neck, the nerve supply being most abundant in this region.

Urinating is frequently painful and difficult, or sometimes urethral spasms make it impossible. Hot water or hot fomentations have to be employed to relax the spasm before the bladder can be voided. When the trouble is due to some morbid condition of the urine, a chemical test will clear up the diagnosis.

Diagnosis.—Generally a chemical test and a microscopical examination of the urine excludes organic disease; also the absence of albumen, pus, blood, and excess of vesical epithelium. Simple hyperacidity or alkalinity, and extreme concentration or dilution of the urine, are significant. Exploration of the bladder by abdomino-palpation, especially of the inferior portion of the organ, helps to exclude cystitis and foreign bodies. The uterus, ovarian tubes, broad ligaments, the urethra, the pudendum, and the rectum must be examined for the recognized cause of reflex vesical irritation. All neurotic tendencies must be looked into, and taken into account. "If in doubt, a careful cystoscopic examination is conclusive, best by the direct method."—Kelly.

Treatment.—The cause is to be removed by the means most applicable to each individual case. A carefully-prescribed and suitable hygienic and tonic regimen is very necessary to improve the condition

of the nervous system. Open air, sun-baths, and a well-regulated system of physical culture are valuable remedial agents in the treatment of most nervous women. All bad or injurious habits should be sought after and corrected. Tonics of iron and strychnine are especially serviceable in toning up the system. Hot vaginal and rectal douches, hot sitz-baths, and applications of moist or dry heat to the lower pelvic region over the body of the bladder, over the supra-pubic region, over the neck of the bladder, are most valuable to relieve pain. The heat acts as a sedative. A hot-water bag placed over the seat of pain often gives quick relief. Hot fomentations may be first applied and the hot-water bag placed over the hot flannel, so as to keep the heat, using care not to get the bedclothing wet, which may be done by placing a hot towel, folded, over the hot-water bag for protection.

Chloral hydrate and bromide of potassium, equal parts, ten to fifteen grains of each, may be injected into the rectum; it may be dissolved in about half a teacupful of warm sweet milk or warm starch-water. After the chloral and bromide have been thus injected, it is usually necessary to press upward with a folded cloth against the rectum for five or even ten minutes, to prevent the medicine from being ejected. In some instances from twenty to thirty grains of chloral may be given in a solution alone per rectum, as above described. If this does not afford relief, extract of belladonna, one-half grain, may be given in a suppository by the rectum, to relieve severe pain. Constipation may occasionally be overcome with small doses of calomel and soda. Wythe's triturates, one-tenth of a grain night and morning, or one-twentieth of a grain, may be sufficient to overcome constipation. In severe cases of constipation a good plan is to take one-tenth of a grain every two hours until the bowels move; then follow this with a dose of Rochelle salts. The small doses of calomel and soda may be repeated occasionally if the tongue becomes brown-coated at the base or back part. The food should be such as the patient can easily digest. Too concentrated urine, or the passing of too little urine, calls for a more liberal amount of water. As a rule, patients suffering with too concentrated urine do not drink enough water. Mild diuretics, as buchu, are very useful in all alkalinity and acidity of the urine. If the urine is acid, the alkaline waters are needful, such as Vichy or Apollinaris; lemonade is also useful in acidity of the urine, as it becomes alkaline with the action of the gastric juices. It is also beneficial in inflammatory rheumatism. The lemonade may be combined with two or three grains of bicarbonate of soda and drunk while effervescing.

Alkalinity of the urine is corrected by the use of the benzoates. Ammonium benzoas, five grains every four or five hours, administered in an infusion of buchu, two or three tablespoonfuls to one or two ounces with a wineglass of water, will soon correct the alkalinity of the urine. Patients who suffer with irritability of the bladder from excessive alkalinity of the urine can have test paper (red litmus paper),

and test the morning urine themselves; if it turns the red litmus paper blue, they will know why they have an irritable bladder, and can resort to the use of the benzoate of ammonia and infusion of buchu; when the urine is no longer irritable, they can rest from its use. The writer has found that currant juice or jelly, one tablespoonful taken in a half tumbler of water every three or four hours, will soon correct the alkalinity of the urine. In all such cases a physician should be consulted.

Some writers,—Jewet and others,—recommend, in cases of unurisis, belladonna pushed nearly to the point of intolerance, keeping in mind the antidote for belladonna, which is morphine.

The galvanic current of electricity, to the strength of five to twenty milliamperes, the anode-active placed over the urethra, the cathode placed over the hypogastric region or in the vagina, according to the cause of the irritation of the bladder, will give very satisfactory results. The sittings may be given once or twice daily, each seance from ten, fifteen, to twenty minutes. After each seance a hot vaginal douche should be given, which seems to enhance the value of the galvanic current. May use twenty per cent solution of cocaine on absorbent cotton; place over the mouth of the urethra while giving the galvanic current.

CYSTITIS—INFLAMMATION OF THE BLADDER.

Cystitis in women is of frequent occurrence. The case may be acute or chronic, local or general. It varies greatly in intensity and duration, lasting from a few days to several weeks. In the beginning of the trouble there is congestion and swelling of the mucous membrane affected. In fully-developed cystitis there is more or less inflammatory thickening of the bladder wall, and the mucous surface is covered with muco-pus, and frequently eroded in patches. Slight hemorrhage may occur from the denuded areas.

Etiology.—The causes of inflammation of the bladder are both local and general, although such distinction is not always absolute.

The most important in general are the infectious diseases, especially typhoid fever, acute articular rheumatism, pyæmia and septicæmia, erysipelas, influenza, mumps, scarlet fever, and smallpox, in which slight degrees of cystitis are frequent. In these diseases also the milder varieties of the acute nephritis are common, and the inflammation of the bladder, like the nephritis or inflammation of the kidneys, is said "probably to be the result of the local action of the bacteria or toxins demonstrably or presumably concerned in the origin and progress of these diseases." The frequent association of cystitis and gout is most satisfactorily explained as the result of a direct irritation by the concentrated urine of the mucous membrane of the bladder. The local causes are injuries to the bladder, which may result from the use of unclean instruments, or irritating urethral injections, or from the presence of fæces in the rectum, of pessaries in the vagina, or the fœtal

head of childbirth. Also important local causes are foreign bodies, calculi, and invading bacteria, especially the gonococcus; certain medicinal agents, as cantharides, copaiba, cubebs, and mustard, when absorbed and eliminated by the kidneys, may produce a cystitis. Retention of the urine from any cause, whether induced by strictures, prostatic enlargement in the male, vesical tumors, or by defective muscular contraction, as in paraplegia, is capable of exciting cystitis. Inflammation of the bladder may also be caused by the extension of inflammation from neighboring parts, as the urethra, rectum, uterus, vagina, or peritoneum, as is illustrated in the use of an unclean catheter.

Morbid Anatomy.—"The anatomical changes [quoted from Wood] to be found are either characteristic of a catarrhal inflammation or are indicative of a pseudo-membranous or a phlegmonous process. In acute catarrhal cystitis the mucous membrane is reddened and swollen, and the contents of the bladder are either slimy or purulent, in accordance with which difference a cystitis is regarded as catarrhal or suppurative. In chronic cystitis the mucous membrane is of a bluish-slate color in spots, and the contents of the bladder are more slimy than purulent. The pseudo-membranous cystitis is characterized either by the presence of fibrinous or, more frequently, by ecchymoses ulceration and superficial necroses of the mucous membrane, diphtheritic cystitis. These necroses appear as opaque, gray, or yellow patches, especially at the neck of the bladder and upon projecting folds of mucous membrane, and may contain urinary salts. In phlegmonous cystitis the submucous tissue is destroyed, and the mucous membrane may be detached in shreds or flakes, or even be exfoliated as a cast of the interior of the bladder.

Symptoms.—The earliest as well as the most distressing and persistent symptom of inflammation of the bladder is pain. This may be preceded by a chill and fever, and the latter may last for some time during the progress of the acute inflammation. The pain is usually referred to the region of symphysis, but may extend to the perineum and to the rectum, and is somewhat relieved by micturition. More severe and distressing is the frequently-associated vesical tenesmus; when intense it is called stranguary, compelling frequent micturition, perhaps every few minutes, at the end of which a few drops of blood may escape. The urine is opaque, high colored, and acid or alkaline. At the outset it may be free from albumen, although, later, albumen occurs, in consequence of the presence of pus or blood. "A grayish sediment, the so-called mucous slime, is formed, in which are particles of slime, giving the reaction of mucin, and numerous polynuclear leucocytes, cells of vesical epithelium, occasional red blood-corpuscles, and often abundant bacteria." In the milder varieties of acute cystitis the fever subsides in the course of a few days, vesical pain and tenesmus gradually disappear, and the urine becomes normal. In chronic catarrhal cystitis the vesical pain and tenesmus may be comparatively

slight. The opacity of the urine becomes greater and the sediment more abundant, containing a larger number of pus corpuscles, and a correspondingly increased amount of albumen. The urine is usually alkaline, and the pus is often transformed into a gelatinous mass, which adheres to the vessel in which it is contained. Digestive disturbances, with slight loss of flesh and strength, often result from chronic catarrhal cystitis.

The severer forms of acute cystitis may be such from the outset, or may be due to an acute exacerbation in chronic cystitis, and usually represent the result of a diphtheritic or gangrenous inflammation of the mucous membrane or the extension of the inflammation to the subperitoneal and paracystic fibrous tissue. The febrile disturbance is greater, the course is irregular, and the range of temperature is higher, with frequent wide daily variations between extremes. The patient may be delirious, somnolent, or in a condition of stupor. The formation of an abscess is indicated by localized induration, pain, and tenderness, often apparent on rectal examination. The abscess may be evacuated into the bladder, with relief to the pain and discomfort, or it may extend toward the peritoneum, with a production of peritonitis. Sloughs of the mucous membrane may plug the urethra, so that in the female they may be withdrawn by forceps. With the continuance of the severe symptoms the patient may collapse, the temperature being sub-normal and the pulse inappreciable.

Diagnosis.—Vesical pain and tenesmus suggest inflammation of the bladder, and the diagnosis is confirmed by examination of the urine.

Prognosis.—The longer the continuance of the cystitis, the more doubtful is the prognosis. Recovery readily takes place in the milder varieties of acute catarrhal cystitis, whereas the prognosis becomes greater if the cystitis extends toward the kidneys or to the neighboring fibrous tissues. The prognosis in chronic cystitis is always serious, from the frequent impossibility of removing the cause, and from the liability to acute exacerbations.

Treatment.—Especially important is the prophylaxis of the vesical inflammation. Among the most fertile sources of cystitis are overdistension of the bladder after labor, and the consequent use of the catheter, which should be avoided if possible. When the patient is unable to pass water in a reclining position, the attempt usually succeeds if she is allowed to assume a half-sitting posture. In all ordinary cases this liberty is justifiable as early as six or eight hours after labor, and it exposes the patient to less danger than does the passing of the catheter. When the catheter must be used, the whole procedure should be managed with scrupulous care, to make it antiseptic; and also the meatus, urethra, and its immediate surroundings, are to be cleansed and washed with an antiseptic,—carbolic acid in sterilized or boiled water, cooled down to the right temperature,—and the instrument passed under direct inspection of the parts. It is equally important for the nurse to have her own hands antiseptic before using the

catheter. The instrument should be warm and anointed with sterilized vaseline before passing it through the urethra into the bladder. If this care is especially observed, infection of the bladder will not occur. Before resorting to the use of the catheter to void the bladder, success in passing the urine is often followed by the use of a hot stream of antiseptic water passed over the meatus urethra, while the patient is on the bed-pan; it should be passed gently and slowly; the rubber tube may be bent a little so as to gauge the flow of water while it is passing over the urethral vicinity. The patient can let the urine flow. Care should be taken not to wet the bed. This method adds comfort to the patient, and it should be preferred to the first.

In the treatment of cystitis, rest in bed, with the hips elevated slightly, and a warm pillow placed under the knees, is the first essential, until the acute symptoms have subsided. The patient should be given a non-stimulating diet, consisting largely of fresh milk, eggs, and light broths. Harlock's malted milk is also very useful in cystitis. Stimulants and stimulating condiments, as pepper, ginger, etc., should be avoided. The free use of saline laxatives, as Rochelle salts and sulphate of magnesia, relieves vesical irritation. The skin should be kept active by warm bathing, hot vaginal douches, and warm, suitable clothing. It is especially important that the extremities be warmly clad. If the urine be acid, it should be rendered neutral and non-irritating by the free use of alkaline drinks; citrate of potassium, ten to fifteen grains, three to six times a day, in a large wineglass of water, or flaxseed tea is very beneficial. Alkaline urine calls for benzoate of ammonium, given in doses of ten grains, in flaxseed tea or warm milk, every two or three hours, until the urine is rendered slightly acid. Citric-acid lemonade is said to have a like effect. Salol is particularly useful in alkalinity or in ammoniacal decomposition. The dose is from five to ten grains every two or three hours. After the patient has recovered from the attack of cystitis, it is a good plan to take one or two doses of salol daily for a month or two, as it acts as a disinfectant. Boric acid, given by the rectum, in doses of ten to twenty grains, at bed-time, in flaxseed tea, is a useful corrective when the urine is very offensive. The injection of liberal quantities of pure water acts to dilute the urine and render it less irritating. Hot flannel over the hypogastric region, and a hot-water bag placed over the compress, give great relief. Hot sitz-baths are useful. A suppository of extract of belladonna, quarter of a grain, and one grain of opium, given by the rectum every six hours until the pain is relieved, may have to be resorted to. Hyosciami or chloral hydrate is often successfully used. Ten grains of chloral in a half teacup of warm milk is the best method of administering it. It is best given by the rectum, in which case the dose should be doubled. Chloral is considered the least objectionable of any of the narcotics. In cases of insomnia chloral may be given by the rectum, and it acts in a most satisfactory manner. The action of bromide of sodium, in twenty-grain doses, in lemonade, given by the

stomach, and repeated once in four or six hours, is often salutary, more so than opium for the relief of pain and tenesmus or straining, especially in highly nervous women. Cannabis indica in many cases subdues the pain equally as well as opium, and it has not the constipating effect. Rarely hypodermic injection of morphine is necessary. Fluid extract uva ursi, teaspoonful every three hours, fluid extract buchu, teaspoonful every three hours, or sodium salicylate is often given, from forty to fifty grains in twenty-four hours.

Woods recommends in subacute or chronic cystitis the stimulating diuretics, oil of cubebs, oil of copaiba, oil of sandalwood, terebene, and oil of turpentine. These stimulating diuretics in acute cases of inflammation of the bladder are harmful.

Before beginning catheterization, salol should be given so as partially to disinfect the urine. A rubber catheter is preferable, and should be kept in a bichloride solution, and washed in hot water after using. As the catheter is passed through the urethra, a solution of bichloride, 1 to 4000, should be sent through it, so as to disinfect the urethra. The bladder should then be washed out with a strong solution of table salt,—a large tablespoonful to a quart of sterilized water,—and this should be followed afterward by a salt solution one-fourth as strong. After a time, when catheterization is daily practised, the tissue becomes so hardened and difficult of infection that absolute asepsis as to the catheter is all that is required.

In acute cystitis, if relief is not obtained in from twenty-four to forty-eight hours, the bladder should be washed out. Some writers recommend simple sterilized water. The writer uses boric acid, ten grains to the ounce of sterilized water. The patient is allowed to pass the solution in from five to ten minutes after the injection into the bladder. Two to four ounces is the usual amount of the boric solution injected, then sterilized water for rinsing out the bladder is used. This treatment is repeated twice a day. Silver nitrate in one-half to two per cent solution is recommended, and is, according to the opinion of various surgeons, the most generally efficacious of all the local applications. In many cases it produces great pain, and it should, therefore, be first used in small quantities and in the weakest solution; one-half of one per cent to one and two per cent solution should be persistently used. In washing the bladder, it is better to never fully distend the bladder. When the soft, warm rubber catheter has reached the bulbomembranous portion of the urethra, sterilized water should be sent through it by means of a fountain syringe, and allowed to flow back, so as to wash out the urethra. The catheter should then be passed into the bladder, and from one to two ounces of the solution injected and afterwards withdrawn. About the same quantity should be injected several times, until the viscus is thoroughly cleansed. To prevent absorption, the final washing should be simple sterilized water. There are reported cases of poisoning from the use of boric acid. In most cases the solu-

tion for washing the bladder may be alternated with other solutions, as salicylate of sodium. Dr. Jewet recommends methylene blue, gr. i to gr. ij, water, oz. j; hydrogen-dioxide, diluted with one to three measures of boiled water, as useful injections in purulent cases. Injections of ichthyol in water (one-half to one per cent) have been highly recommended. Ichthyol is especially useful in gonorrhœal cystitis.

In cases of much pain after the use of a stimulating injection, the bladder may be washed out with a solution of hydrochlorate of cocaine, using a few drops of a two to four per cent solution. Care must be taken that a toxic dose of cocaine is not left in the bladder.

Some writers recommend that, for the relief of pain after washing the bladder with any irritant, morphine, one to two grains to the ounce of sterilized water, be injected and retained about five to ten minutes, and then ejected.

When there are erosions in the bladder and along the urethral canal, toxic medicines are no doubt more or less absorbed, hence great care should be taken in these cases.

When other measures fail, the bladder must be drained, as recommended by the writer upon this subject, which comes under the domain of surgery.

Many women who have chronic cystitis, and who need to have the bladder washed out daily, can be taught to do this by their attending physician. A small fountain syringe and a rubber catheter, and a short glass tube for connecting the catheter to the rubber tubing, is all that is needed. The syringe should be put into boiling water a few minutes before using it, and a stream of boiling water with a little boracic acid in the water, should be passed through the syringe, after the catheter is attached to it; this stream of boiling water sterilizes the tube and catheter. Let the solution of boracic acid—ten grains to the ounce of water, two to four ounces, is the amount generally prescribed by the writer—cool down to a little more than blood heat. This should be prepared ready to put into the syringe immediately after the boiling water has been passed through the syringe, which keeps warm until the solution is all injected. Just before passing the catheter into the bladder, let the solution pass down into the catheter until a few drops flow out, quickly pinch the rubber tube tightly, and, having the catheter previously anointed with sterilized vaseline, it may now be passed gently and gradually into the bladder; let the solution flow in until all has passed out of the fountain, and not quite all passed out of the tube; pinch it again gently and quickly, withdraw the catheter slowly, while the tube is being pinched or bent, so as not to admit of any air passing into the bladder. The writer teaches some chronic patients this procedure, and they wash out the bladder daily, and so far she has never had a patient who has performed this part of the treatment of the bladder according to instructions, that has not improved under her own care. Oftentimes patients are not financially able to

go to a physician daily for this treatment, and when a woman is intelligent, and has some confidence in her own ability, she will easily be instructed. It is a good plan to have the patient take an antiseptic wash before she washes out the bladder, so as to disinfect the vicinity of the urethra, and also her hands should be washed with hot water and soap before using the catheter, especially her finger nails should be antiseptically treated before the commencement of the irrigation of the bladder.

TUBERCULOSIS.

Tuberculosis is regarded as a very rare disease. It is said, however, that cystitis may yet prove to be more frequently of tuberculous origin than has hitherto been assumed.

Pathology.—The favorite seat of vesical tuberculosis is the neck of the bladder. In the early stages of the disease, the mucosa is described as being studded with miliary tubercles. These coalesce into caseous nodules, and later the tuberculous patches break down into ulcers.

Symptoms.—Are those of cystitis.

Diagnosis.—Absence of the usual causes of cystitis are significant. Tubercular disease of the bladder is at once suggested by the presence of tuberculosis in other organs. Direct examination through the open speculum is the most conclusive.

Prognosis.—The prognosis is bad. In exceptional cases the patient may live for many years. Generally in two or three years death results from general tuberculosis.

Treatment.—The systemic treatment does not differ from that adopted in tubercular diseases in other organs. Local injection of glycerine-iodoform mixture has been found useful. Pain is to be controlled as in other forms of cystitis. The tuberculous patches can be satisfactorily treated by electrolysis. Wash the neck of the bladder and the meatus and the surrounding parts with peroxide of hydrogen, then with sterilized water; then put on iodoform ointment after the electrical seance. It is best done with a platinum needle. Sometimes one treatment of galvanism is sufficient. The peroxide is used daily, a teaspoonful in a half to a teacupful of sterilized water for cleansing. Dress with iodoform ointment, two drams to one of vaseline.

INVERSION OF THE BLADDER.

Inversion of the bladder through the urethra is very seldom met with. It consists generally, as is said, in a prolapse of all the coats, not of the mucous membrane alone. It may occur at any age, but is most frequently observed in children. It is sometimes brought on abruptly by violent straining efforts during defecation or micturition.

Symptoms.—In partial prolapse of the vesical wall before the tumor makes its appearance at the meatus, the symptoms do not differ

essentially from those of a foreign body in the bladder. In adults there is abdominal pain and vesical tenesmus when the prolapse is complete. In children these symptoms are seldom noted. The tumor is said to reach the size of an orange, but is usually easily reducible. In chronic cases the vulva and thighs are eroded from the constant dribbling of the urine. Continued contraction upon the ureter sometimes results in urethritis. Extension of the inflammation may reach the kidneys, and uræmia may then result.

Diagnosis.—When reduction is possible, differentiation is easily made between vesical polypi and inversion by exploring the cavity of the bladder, after replacing the tumorous or protruding mass.

Urethral polypi can not be reduced within the bladder. The tumor in the urethral prolapse springs from the margin of the meatus, while in vesical prolapse it is encircled by it. In the former, as protruding mass, the urethral opening appears in the center of the tumor; in the latter, it is annular, and surrounds the neck of the tumor.

Treatment.—The vesical protrusion should be carefully cleansed, and, if possible, replaced. First elevate the hips considerably for gravitation; oil the tumor with sterilized olive oil, and use gentle taxis. The use of a large sound helps to secure complete reduction, but it should be very carefully used, or omitted altogether if possible, owing to the danger of mechanical injury to the bladder. In partial inversion, slight forcible distention of the organ by the means of a suitable injection may assist in repositing the prolapsed portion. In difficult cases the manipulation should be undertaken with the aid of an anesthesia. After the reduction of the prolapse, the patient must rest in bed for several days. A compress of surgeon's lint or sterilized gauze and a "T" binder may be used for retention. Straining at stools must be prevented by the use of laxatives or rectal injections, and vesical tenesmus controlled by suppositories of opium or hyoscyamus, or other suitable measures.

VESICO-VAGINAL FISTULA.

Vesico-vaginal fistula is a direct communication between the bladder and the vagina. The size of the opening may be no larger than a pin-point, or the whole vesico-vaginal septum may be destroyed. The opening may be round, angular, or a mere slit. Usually there is but one orifice. Occasionally there may be several. The tissues about the fistula may vary greatly in thickness, density, unevenness of the surface, and color. Dr. Malcolm McLean describes a case in which half the bladder was found prolapsed through a large vesico-vaginal fistula, and protruding at the vulva. The fistulous opening extended from the cervical junction to within three-eighths of an inch of the pubic arch. The width of the fistula, transversely, was two and one-fourth inches. The urethra was also destroyed.

Etiology.—Vesico-vaginal fissure occurs most frequently from dif-

ficult labors during childbirth, in which the head of the child is arrested in the lower portion of the birth-canal. Necrosis takes place from long-continued compression of the vesico-vaginal wall between the head and the pubic bones, and the injured structures subsequently slough off, leaving a fistulous opening. Lacerations occurring during forceps or other instrumental deliveries seldom invade the bladder. Very rarely calculi or other foreign bodies in the bladder may perforate the vesico-vaginal septum.

Symptoms.—The most prominent symptom is the discharge of the urine through the vagina. In case of a large fistula the flow will be constant. If the opening is small, the escape may be temporarily prevented by the pressure of the anterior vesical wall against the orifice. Sometimes a portion of the urine may be voided through the natural channel. The vaginal canal frequently becomes coated with urinary salts. In all cases the vulva and the inner surface of the thighs are excoriated by irritation from the discharge, and the odor of the decomposing urine is given off from the person and the clothing of the patient.

Diagnosis.—Large fistulæ can be diagnosed by the vaginal touch; small ones by ocular inspection, with the aid of a small probe or sound. By injecting into the bladder milk and water, or methyl-blue, one grain to the ounce, the existence and the location of a fistula can be most readily demonstrated. Pozi suggests that the anterior wall of the vagina be dried carefully and covered with a piece of absorbent paper; a moist spot on the paper locates the seat of the fistula. When once located the direction and the extent of the fistulous tract may be determined by the probe. Sometimes the examination is rendered difficult by cicatricial contraction of the vagina. Preliminary dilatation may then be necessary to expose to view the seat of the fistulous opening.

Treatment.—For vesico-vaginal fistula, the treatment is: first, preparatory, building up the general constitution for a time, tonics, and hygienic treatment for the improvement of the general health. Time must be allowed after labor for a completion of the process of involution and for full convalescence. This usually requires three months at least, or even more.

The diseased structures about the fistula should be placed in the best possible condition for repair. The vaginal canal should be kept clean from urinary deposits, with hot boric-acid douches, two drams to the quart of water, repeated two or three times a day, for some weeks previous to the closing of the fistula, or operating. Erosions of the vagina may be touched with nitrate of silver (ten grains to the ounce of water) three times a week if necessary, for the same length of time; for closing of the vesico-vaginal fistula calls for an operation, which should be performed by a gynæcologist of some experience in this branch of medical work.

STONE IN THE BLADDER—VESICAL CALCULI.

Stone in the bladder is a far less common affection of the female than of the opposite sex. This is said to be accounted for mainly by the greater facility with which small stones are expelled through the female urethra.

Symptoms.—The patient suffers from frequent urination, dysuria, tenesmus, and occasionally onuresis. The flow may be abruptly cut off at micturition, owing to the occlusion of the vesical neck by the stone. A more or less severe cystitis always coexists. Hæmaturia may occur if the shape of the calculus be such as to cause abrasions. The urine contains pus, epithelium, and mucous, with amorphous crystals of triple phosphates.

Diagnosis.—"The diagnosis is made with the sound, by a cystoscopic examination, by digital exploration through the urethra previously dilated, or by conjoined abdominal and vaginal palpation. As rigid an asepsis should be observed in the use of the exploring finger and sound as is practised in major operative procedures.

"The bladder should be evacuated and thoroughly irrigated with a normal salt solution, or, better, with a two-per-cent boric acid solution.

"When a sound is to be used, the bladder should be moderately distended with a two-per-cent boric acid solution, or a normal salt solution. The movements of the sound are thus unobstructed, and vesical folds which might envelop the stone are obliterated. The search is to be systematically conducted, first over the most dependent portion of the cavity, then over the rest of the bladder walls, one or two fingers of the disengaged hand guiding and assisting the manipulations through the vagina.

"Cystoscopy, or digital exploration, may serve to discover an encysted stone which has escaped detection by the sound. Dilatation of the urethra, sufficient to admit an index finger of not more than average size, is rarely followed by persistent incontinence. The digital exploration is to be assisted with the fingers of the other hand, through the vagina.

"*Prognosis.*—The prognosis is good in the absence of renal and severe vesical lesions.

"*Treatment.*—Calculi may be removed by the way of the urethra, or by vaginal or supra-pubic cystotomy. Small calculi can be extracted through the urethra, after dilatation with graduated dilators, or removed with slender forceps through a Kelly speculum. Moderately large stones, if friable, may be crushed by the usual method, or under direct inspection with the aid of the open speculum, the debris washed out. If there is much cystitis, and the stone be of large size, and too hard to be crushed, vaginal or supra-pubic cystotomy is to be preferred; for not only may the stone be thus removed with less resulting injury to the bladder, but drainage for the diseased organs is secured. This method of treatment is surgical."

FOREIGN BODIES IN THE BLADDER.

Foreign bodies may be introduced into the bladder through the urethra, either by accident or by intention. Lead pencils, pipe stems, ligatures, hairpins, crochet needle, rubber womb protector, are among the articles reported to have been found in the bladder. Stumpff is said to have related a case of hæmaturia due to the presence in the bladder of a pigeon's feather, covered with ointment.

Symptoms.—The symptoms are reported to be substantially the same as in stone.

Diagnosis and Treatment.—The same as for stone in the bladder.

VESICAL TUMORS.

Tumors or neoplasms of the female bladder are of infrequent occurrence. They include papiloma, myxoma, fibroma, myoma, sarcoma, epithelioma, and carcinoma. The malignant forms are more frequently met with than the benign. "Most commonly their site is the base of the bladder."

Symptoms.—The most common symptom of vesical neoplasm is hæmaturia. Growths at the neck of the bladder give rise to frequent and painful urination. By falling over the urethral orifice, they may interrupt the flow of urine at micturition, or may cause retention. Clots from free hemorrhage may obstruct the vesical orifice. Tenesmus is usually extreme. Cystitis may be looked for sooner or later. Urethritis and pyelonephritis commonly supervene. Fragments of the tumor are occasionally expelled through the urethra. Tenesmus aggravates the morbid condition of the mucous membrane. With the growing neoplasm the hemorrhage increases. The urine contains pus, blood, mucus, epithelial scales, neoplastic shreds, and phosphates. The general health is in time impaired, the patient becoming thin, anæmic, and cachectic.

Diagnosis.—Diagnosis is made by conjoined abdominal and vaginal manipulation, by the electric cystoscope, by direct examination with the finger through the urethra, or by ocular inspection through the open speculum.

Treatment.—Very small growths, which are pedunculated, may be twisted off and removed through the urethra. "Troublesome hemorrhage is to be controlled by irrigation with warm water, or by gauze packing, with counter-pressure over the abdomen. The large tumors are removed through the urethra, by a vesico-vaginal incision, or by epicystotomy. For a few days after the operation the bladder should be washed out daily with a two-per-cent solution of boric acid; the urine, in the meantime, is to be kept bland by alkaline drinks."

The Burne and Skene method consists in employing the cautery in the treatment of vesical neoplasm. Skene makes a vesico-vaginal fistula, brings the growth, or sections of it, into the opening, and when

possible through the vagina, clamps the base, most of which should be normal mucous membrane, with forceps, cuts it off with the galvano-cautery, and desiccates the portion within the grasp of the forceps. The bladder is carefully washed out with a half-strength Thiersch's solution and closed. For twenty-four hours after the operation the catheter is passed every two hours, then every four hours.

THE URETERS.

Anatomy.—The ureters are the membranous tubes which conduct the urine from each renal pelvis of the kidney to the urinary bladder within the pelvis. They are generally about fourteen and a half inches in length, and from one-eighth to one-sixth of an inch in diameter (according to McClellan). They are behind the peritoneum, and appear as pale collapsed tubes, descending in the psoas muscle, and passing over the bifurcation of the common iliac arteries. In the female the ureters penetrate the plexus of uterine veins beneath the broad ligament. The walls of the ureters consist of three coats. There are many lymphatic vessels, and a few arteries derived from the renal, lumbar, and common iliac arteries. The nerves come from the renal and hypogastric plexuses.

DISEASES AND INJURIES OF THE URETERS.

Stone in the Ureters.—A calculus is liable to pass from the kidney through the canal, and do but slight injury to its mucous membrane, or it may cause deep abrasions, or become lodged in the tube. It is said when a stone is arrested in its descent, it lodges most commonly about two inches below the kidney, at the constriction of Bruce Clark, or at the bladder orifice of the ureter. Uretritis follows, and if the obstruction is not relieved, hydronephrosis and destruction of the kidney results.

Symptoms.—When a stone enters the ureters, renal colic ensues. The pain sets in abruptly without apparent cause, or it may be initiated by sudden muscular efforts. It is characterized by agonizing pain, which starts in the flanks of the affected side and passes down the ureter. Vomiting occurs during the painful paroxysms. Micturition is frequent, occasionally painful, and the urine is sometimes bloody. There is tenderness on the affected side. In very thin persons the stone may possibly be felt on abdominal palpation along the course of the ureters. When the stone is arrested in the pelvic portion, it may be located by palpation through the rectum.

Treatment.—"When the obstruction is complete, as is shown by negative catheterization of the ureter, an operation is indicated."

Ureteritis.—Ureteritis sometimes occurs from extension of the inflammatory process from the bladder, from the kidney, or from the surrounding structures, or may arise from causes which reside in the

ureter itself. The disease may be septic from gonorrhœa, or tubercular in character, and may affect one or both ureters. Peri-ureteritis may result by the inflammation spreading to the surrounding connective tissues.

Symptoms.—An almost constant symptom of ureteritis is frequent desire to micturate. There is sharp, burning pain over the ureter, most usually on the left side. Pain is increased during menstruation, and is sometimes so intense that the patient is confined to her bed. The urine is frequently scanty, and is of a highly acid reaction in the absence of cystitis, and it is said to contain pus and blood. The presence of pus without excess of mucus is almost diagnostic of ureteritis. On palpation through the vagina the ureters are found thickened, tender, and sometimes sacculated. The patient complains of severe pain and desire to urinate when the inflamed ureter is pressed under the finger.

"Skene states the history in cases following obstetrics. The symptoms are those of pelvic pain and tenderness in the lower abdomen, which at first may not be severe. Usually the symptoms become more acute after a time, the pain and tenderness increasing rather abruptly. A chill or rigor may occur, with some tympanitic distension of the bowels, and the temperature may rise to 102 degrees or even 105 degrees Fahrenheit, with corresponding acceleration of the pulse. The tenderness is markedly increased on pressure, and manual manipulation of the affected part causes distress rather than acute pain. These symptoms increase in severity in from three to five days, and soon thereafter pus and blood may be found in the urine. With the appearance of purulent urine the patient's condition generally improves; pain and tenderness are to some extent relieved, the pulse becomes less rapid, and the temperature falls. The bleeding subsides in a few days, but the pus discharge continues for a week or more. In other cases the inflammation pursues a different course, and about the time that pus appears in the urine and is discharged into the bladder, acute disease of the kidney supervenes, with diminution of the urinary secretion and varying degrees of uræmic intoxication."

Treatment.—The coexistent cystitis should first be treated in the usual manner. Rest in the recumbent posture must be insisted upon, the bowels freely open with salines,—Rochelle salts, Epsom salts, sulphate of magnesia, citrate of magnesia are the saline mixtures usually used in these cases,—morbid urinary conditions corrected, and the urine rendered antiseptic with salol. In vesical irritation if the urine is acid, hot lemonade will soon give relief. It should be taken every hour or two. It will aid in rendering the urine less acid. If the urine is alkaline, pure unadulterated currant jelly, one tablespoonful stirred into a large tumblerful of boiling water, is very palatable. It may be taken every three hours. The juice of navel oranges and grape-fruit are valuable aids in correcting the alkalinity of the urine.

The diet should be restricted, largely milk, if it does not cause flatulence; many women can not digest milk comfortably, in which case Harlock's malted milk may be tried, as it usually agrees with most patients. A pint of boiled water may be drank an hour before regular meals. Vichy's mineral water acts favorably by flushing the urinary tract.

"Skene advises high rectal enemata of warm water; given in quantities from one pint to one quart, it will be absorbed, and have a diuretic effect. If there is constriction of the urethral orifices sufficient to cause hydro-ureter, catheterization followed by dilatation with bougies, is indicated."

"Bozeman makes a large opening in the base of the bladder in the region of the ureter, and brings it under direct observation. He then passes a catheter, and through it irrigates the ureter and pelvis of the kidney with a bland antiseptic solution."

Operative and Other Injuries.—The ureter is liable to injury in abdominal operation upon the pelvia viscera and in vaginal hysterectomy. The ureters are liable to be ligated through mistake or severed, as has been recorded in several instances. The treatment is to do the work over, and thereby correct the errors made.

Extirpation of a normal kidney, for injury or disease of the ureter, is considered by some writers as utterly unjustifiable, except where the ureter can not be restored.

CHAPTER XI.

DISEASES OF THE RECTUM AND ANUS.

RECTUM.

Anatomy (McClellan's).—In the adult the rectum is situated entirely within the true pelvis, while in the infant its upper portion is in the false pelvis, or lower part of the abdomen. In the infant it is also nearly straight, but in the adult it presents three marked curves, one lateral and two antero-posterior, as follows: It commences opposite the left sacro-iliac symphysis, curves slightly to the right of the median line, and then descends, adapting itself to the shape of the sacrum and coccyx, and at the tip of the coccyx it bends backward to terminate in the anus. The rectum is cylindrical. It is narrowest at the upper part, and gradually increases in size toward the anus, immediately above which it presents a dilatation, the ampula analis, capable of being enormously extended. The rectum is about twenty centimeters, or eight inches, in length, and its upper portion is entirely invested with the meso-rectum. Anteriorly, the recto-vesical pouch of the peritoneum is within from seven to ten centimeters, or from two and a half to four inches, of the perineum. Posteriorly, the peritoneum does not come within nine centimeters, or three and a half inches, of the anus.

The muscular coat of the rectum differs from that of the cæcum and colon in that its longitudinal layer completely surrounds it, and that both the longitudinal and the circular fibers are well developed, resembling those of the œsophagus.

The longitudinal fibers become lost in the connective tissue about the anus. They are augmented by a band of fibers which extends on each side from the coccygeal vertebra to the margin of the rectum, the recto-coccygeus muscle.

The circular fibers become thickened about six millimeters, or about one-quarter of an inch, from the anal orifice, forming the internal or deep sphincter-ani muscle. The external sphincter-ani muscle is very closely associated with the skin, from which it is difficult to separate it, except in the most recent state. It is elliptical, consisting of two layers of curved fibers which arise from the ano-coccygeal ligament and the tip of the coccyx, and, surrounding the anus, are attached mainly by a pointed slip at the central tendon of the perineum. There are numerous fibers from the superficial layer, which intermingle with several adjacent muscles, and decussate with one another in front of

and behind the anus. The deep layer is in relation with the internal sphincter-ani muscle, which is the ring of involuntary circular and muscular fibers surrounding the lower portions of the rectum, six millimeters, or about a quarter of an inch, from the margin of the anus. The external sphincter is a voluntary muscle supplied by the fourth sacral nerve, and by its tonic action it keeps the anus closed. In the operation of fistula-in-ano the external sphincter is divided in order to keep the parts at rest during the healing process, and the incision should be made parallel to the course of the inferior rectal vessels. These vessels arise from the pudic, and cross obliquely with the anal nerves through the ischio-rectal fossa to the lower wall of the rectum, and the skin about the anus. Occasionally they are of large size, and, if wounded, may give rise to troublesome bleeding. The mucous membrane of the rectum is very vascular and thick, and so loosely attached to the muscular coat that in children in whom the bowels are straighter, as stated above, it predisposes to prolapsus. There are three permanent semilunar folds of the mucous membrane—Houston's valves. The first, situated opposite the prostate gland, projects backward; the second, opposite the middle of the sacrum, projects inward from the left side; the third, near the commencement of the bowels, projects from the right side. The middle one is always the most prominent. When the rectum is empty the mucous membrane appears folded longitudinally (volumnæ-recti), and at the verge of the anus is gathered into looped folds, called the valvulæ morgagni.

The arteries which supply the cæcum and the colon are the branches from the right border of the superior mesenteric artery, and branches from the superior mesenteric artery. They are the colica media, colica dextra, colica sinister, colica sigmoidea, and ilio-colic arteries. The veins from the different portions of the colon join the inferior and superior mesenteric branches of the portal system. The rectum has a special blood supply from three diverse sources. The superior rectal, or superior hemorrhoidal artery, comes from the inferior mesenteric artery; the middle rectal, or middle hemorrhoidal artery, from the special blood supply from three diverse courses. The superior rectal, or inferior hemorrhoidal artery, from the internal pudic artery. The disposition of the arteries in the lower part of the rectum is very peculiar. They pass parallel to one another toward the anus, and freely communicate by large transverse branches. The veins are similarly arranged, and establish the hemorrhoidal venous plexus about the lower end of the rectum. The main trunks from the latter are the superior hemorrhoidal veins, tributaries of the inferior mesenteric vein, and the middle and inferior hemorrhoidal veins, which terminate in the internal iliac veins, so that the portal and general venous system are brought into direct communication. To this fact is chiefly attributed the tendency of the veins about the anus to become varicosed, and to the formation of piles or hemorrhoids. The nerves of the rectum

are derived from the inferior mesenteric, hypogastric, and sacral plexus.

The anus, or rectal orifice, is an irregular puckered opening about three-fourths of an inch in length, during life, when distended. The wrinkling of its margin is caused by contraction of a thin layer of involuntary muscle-fibers in the sub-cutaneous tissues, called the corrugator-cutis-ani muscle. Close to the verge of the anus, there are clusters of papillæ, and many minute glands which secrete an oily substance. On the border line between the skin and the mucous membrane, the anal veins often present varicosities, which, when large, constitute external piles. This border line also presents a fine white streak which indicates the interval between the external and the internal sphincter-ani muscle. The anal branch of the pudic nerve supplies the skin of the verge of the anus; and a great pain often experienced in a fissure of the anus, is due to the exposure of the filaments of this nerve in the torn tissue.

Physiology.—When at rest the sphincters are constantly on guard, and keep the orifice closed. If the patient has a lesion of the dorsal cord, they become relaxed, and there is incontinence of fæces. The act of defecation has for its origin a vague sensation of weight, due to the pressure exercised upon the anus by a fæcal mass. This sensation induces a reflex contraction of the muscular tunic of the rectum, which tends to force toward the anus the accumulated material. If the sphincters offer resistance, an anti-peristaltic action results, pushing the fæcal matter toward the upper part of the rectum. The tonicity of the sphincter, however, has a limit, which is overcome when the column formed by the fæcal material is high. In such cases a single peristaltic movement of the intestines is sufficient for the act of defecation, by which the latter is accomplished in the ordinary way. If the material becomes solid, it requires a severe muscular effort for relief.

Injuries of the Rectum.—Injuries of the rectum are of two kinds, accidental and surgical. The causes of injuries vary, as, falling from a height onto a pointed body, sliding off of high places upon any sharp or pointed instrument or tools, as sliding off a hayrick upon the point of a fork or fork handle, the careless use of a sound or the tip of a syringe. Straining at stools may cause partial rupture of the rectum walls. Parturition is a well-known cause.

Diagnosis.—The diagnosis is usually made by the symptoms, as, local pain, discharge of blood and muco-purulent material by the anus, the passage of the fæcal matter through the vagina or with the urine, or the escape of the urine by the rectum. Hemorrhage is a symptom of sufficient significance to demand interference. Such injuries are sometimes complicated by peritonitis. If the inflammation extends gradually, it may be circumscribed and not be grave, unless the peritoneum has been injured, and there is a communication with the bladder or the rectum. Peritonitis then becomes of a very acute character, and the patient rapidly succumbs. Peri-rectal phlegmen may arise,

the complication of which generally terminates in the formation of a fistula.

Prognosis.—The prognosis will depend entirely upon the situation, extent, and depth of the wound. Recovery in the majority of cases is the rule.

Treatment.—Hemorrhage at the time of the accident may be severe or dangerous even. The cavity should be firmly packed with gauze, or an important blood-vessel should be ligated or secured by torsion. Pain may be allayed with opium. Cold applications or an ice-bag may be applied over the affected region to check the inflammation.

FOREIGN BODIES IN THE RECTUM.

Foreign bodies in the rectum are caused by swallowing some foreign substance, as buttons, small pieces of money, false teeth, etc., those which may have been introduced through the anus, and those which may have been formed in the rectum.

Foreign bodies may reach the rectum through the intestinal tract. Montgomery reports a case of Merton's, in which a fish-bone had perforated the rectal and the uterine wall, and implanted itself in the fœtus.

In cases where subjects have been known to introduce foreign bodies through the anus, they are usually of depraved habits. Pederasty and abnormal sexual impulses are said to afford the motives. The character of foreign bodies reported is such as beer glasses, mortar-pestles, marbles, and pebbles.

In children there are frequently masses of lumbricoid worms. An accumulation of excrement may form a hard mass. Such masses are frequently found in aged women, especially in hysterical and partially demented cases. In the fæcal masses may be found cherry or plum or peach stones imbedded in the hardened fæcal matter. The true cause is the diminished reflex power in the large intestines, and the defective contractions of the muscular fiber, with the presence of a retained hard fæcal mass which acts upon the formation of the structure of the rectal surface. Dilatation of the rectum about a fæcal calculus or impaction occurs, and finally an ulcerative condition or inflammation follows, which constitutes the characteristic lesion.

Symptoms.—The symptoms are those which arise from the accumulation of fæces, also the pain produced by proctitis, a sensation of weight on the perineum, sero-sanguineous diarrhea, which is more or less fetid, but most important of all is constipation. Lumbar and crural pains are prominent, with a frequent desire to defecate, and the inability to perform that function. The fæces, or scybala, are often dry and hardened when they are expelled. Straining and efforts at evacuation are laborious and painful. Prolonged retention of fæcal matter reacts bodily upon the general health, causing toxæmia, digestive disturbance, hepatic pain, and nervous irritability.

If the condition arises as the result of a true foreign body in the rectum, the symptoms are more acute and severe. After about thirty-six hours, the patient is forced to seek surgical intervention, and will complain of pretty severe pain in the belly, and a sensation of weight at the level of the anus. The bladder and uterus may become inflamed. The peritoneum also may become involved in inflammation. Prolonged retention of foreign substance in the rectum may cause inflammation and even gangrene of its walls, pelvic cellulitis, hypogastric phlegmon, abortion, and intestinal obstruction.

Diagnosis.—The diagnosis is sometimes difficult. When the rectum is examined by palpation, if the patient complains of obstinate constipation, with pain in the region of the rectum, perineum, and base of the bladder, with a small hand made to pass into the rectum, a foreign body may be found as high as the sigmoid flexure.

Prognosis.—The prognosis is generally favorable, and will depend, to some extent, upon the character of the body and how it has been introduced. If it is fragile or sharp, and has been introduced through the anus, its removal may be attended with difficulty.

Treatment.—The treatment is varied to suit each case. In some cases it requires all the surgeon's ingenuity to accomplish the successful removal of the foreign body. Where the body is situated high up it may be necessary to resort to abdominal section, and to accomplish its removal by incisions of the intestine and subsequent suture. In some cases, it is said, a posterior rectotomy may be sufficient. Foreign bodies of small size may be extracted from the rectum with the forceps or with the fingers; if large, ether should be given, the rectum dilated, and the body removed. The patient should rest in bed until all inflammation is abated.

Wounds of the rectum are treated by free drainage and antiseptic dressing.

ANAL PRURITIS.

Pruritis of the anus is a symptom, and not a disease. It may be due to piles, fissures, seat-worms, eczema, nerve disturbances, kidney disease, jaundice, constipation, opium habit, torpid liver, dyspepsia, alcohol ,vesical calculus, smoking, urethral strictures, uterine diseases, ovarian trouble, or menstrual disorder. The itching, which is usually fearful, is the worst at night.

Treatment.—The treatment necessarily depends upon the cause, which must be sought for and removed. Before going to bed wash out the rectum with hot water, with a little boric acid in it. Wash also the neighboring parts with very hot water with boric-acid solution, half a teaspoonful to a half pint of hot water; then spread oxide of zinc ointment over the affected parts, and lay a thin piece of gauze between to keep the surfaces apart. The parts may be treated in a similar manner after each micturition.

Another very effective remedy in allaying the pruritis is sul-

phurous acid diluted in hot water, made strong enough to burn a little when it is applied. Wash out the rectum and all the surrounding parts. Wash out the vagina also. When this is done, bathe the parts very thoroughly some four or five minutes; then dry the surfaces and anoint heavily with oxide-of-zinc ointment made with pure vaseline, laying gauze between; this will relieve the itching at night.

A further remedy is nitrate of silver, ten grains to the ounce of water, used during the day, mopped on for a few minutes after the surface has been thoroughly cleansed with hot water and castile soap, and rinsed with hot water; then apply the oxide-of-zinc ointment.

Calomel and subnitrate of bismuth are very useful in ulcerated pruritis. Calomel, one part; bis-sub-nit., three parts; dust it on thickly after thoroughly cleansing the parts with castile soap and hot water.

Matthews recommends: Calomel drs. ij, cosmoline oz. j; anoint the parts at bedtime. Campho-phenique drs. j, water oz. j; use by mopping it on with a swab or camel-hair brush, night and morning. Seat-worms must be removed. (See article on Worms.)

If the patient is suffering from any one of the causes above mentioned, the disease must be treated in order that the pruritis may be permanently relieved.

Some writers highly recommend carbolic acid one part, glycerine twenty parts, infusion of absinthe one hundred and twenty-five parts; use two or three times a day.

FISSURE OF THE ANUS.

Fissure is a crack in the mucous membrane or skin at the anal orifice, producing spasms of the sphincter. The pain is due to exposed nerves, or twigs of nerves, upon the floor of the crack. Fissure is caused by constipation or traumatism.

Symptoms.—The symptom is violent, burning pain, sometimes beginning during defecation, but usually at the end of the act, and lasting for some time. Both constipation and pruritis often exist. Examination discloses a fissure. Sometimes an operation upon the rectum for the removal of hemorrhoids where the rectum was not sufficiently dilated, will cause contraction of the sphincters, and a fissure results.

Treatment.—Give ether, and dilate the sphincter thoroughly, which puts the parts to rest, and anoint them with a lotion made of linseed oil, two ounces; spirits of turpentine, thirty drops. Twice a day is often enough.

The treatment may be palliative and surgical. Wash out the rectum with warm water, and apply a nitrate-of-silver lotion from ten to twenty grains to the ounce, by wrapping a small bit of absorbent cotton very tightly around the end of a toothpick or a knitting-needle, dipped in the solution and pressed up into the base of the fissure, two or three times at one seance. One treatment every day usually relieves the patient.

The surest method is to give an anæsthetic, and stretch the sphincter, and incise the floor of the fissure, scraping it with a curette, after which dress with ichthyol ointment. If piles exist with the fissure, ligate them.

PROCTITIS.

Proctitis is an inflammation of the mucous membrane of the rectum. Among the causes of inflammation of the rectum are hemorrhoids, the abuse of drastics or purgatives, obstinate constipation, foreign bodies, as fish-bones, biliary concretions, worms, and practise of pederasty. Proctitis can be induced readily from gonorrhœa, through the specific discharge from the vagina.

Symptoms.—The symptoms are local, being confined to the lower part of the digestive tube. . The patient gradually experiences a painful sensation in the region of the sacrum coccyx, bladder, and uterus. The anus is red and hot, and very sensitive, and contraction of the sphincter occurs. Constipation is usually the rule, which may persist for several days. Evacuation soon becomes painful, followed by tenesmus, and the expulsion of a glairy mucus and sometimes of blood. After the first period comes another, characterized by profuse diarrhea and muco-purulent discharge. In neglected or badly-treated cases, acute proctitis soon becomes chronic, the symptoms being somewhat similar in character to those already described. Diarrhea alternates with constipation. Examination discloses many points of ulceration, which are rounded and superficial, or extensive vegetations, the latter specially marked in cases of blenorrhagic proctitis. The thick, greenish discharge attending this condition is considered a serious complication. It produces a red appearance, excoriation, and even an eczematous eruption of the perineum. The mucous membrane itself becomes altered, thickened, sclerosed, and narrowing of the rectum may result. In severe cases plegmons, abscesses, or fistulæ, complicating the intense inflammation of the rectum, are sometimes seen. The characteristics of proctitis are sharp pain during defecation, constipation, and a rise of temperature, followed by a mucous discharge and tenesmus. In dysentery (the differential diagnosis), the frequency of the stools, hemorrhages, and the expulsion of shreds of mucous membrane, are the characteristic symptoms, too plain to be mistaken for simple proctitis.

Treatment.—Rest in bed, enema of hot water, followed with astringent injections, such as one-half to one grain of sulphate of zinc to an ounce of warm water, to be administered night and morning.

Nitrate of silver, one-eighth to one-fourth of a grain to the ounce of warm water, given night and morning; or some of the vegetable astringents, as tannic acid or tannin, the fluid extract of hamamelis, or the fluid extract of hydrastis.

Ointments are valuable in these cases. All kinds of sedatives,

opiates, and astringents may be, in turn, tried. Allingham's formula is most efficacious:—

℞: Bismuth subnit.....ʒ ij
Hyd. sub. chlor.....℈ ij
Morph. acet.....grs. ij
Glycerine.....ʒ ij
Vaseline.....ℨ j
Mix.

Syringe out the rectum with hot water, apply the ointment with so-called salve injector, night and morning. This is a very sedative application, and ulcers and sores in the rectum are speedily benefited by its use.

Subacetate of lead, belladonna, and opium will be found serviceable. A combination of extract of hyoscyamus with iodoform is often beneficial, especially where there is tenesmus.

In chronic cases it is a good plan to wash out the bowels high up,—about twelve inches,—with hot water passed through a soft rubber tube which is gently passed high up into the rectum; then, after resting the parts five or ten minutes, inject about one or two ounces of flaxseed tea, with about ten grains of boric acid dissolved in the tea; to be given at bedtime for several weeks, until all symptoms of inflammation have disappeared.

ABSCESSES OR PHLEGMONS OF THE ANUS AND RECTUM.

Abscesses in Ano, Ending in Fistula.—The causes are many and various, and several causes may combine to produce the result. These may be generally specified as injury to the anus, exposure to wet or cold, and particularly sitting upon damp seats after exercise, when the parts are hot and perspiring.

Deep-seated suppuration is often found to occur after severe itching in the part, with only redness on the surface. It may result from violent irritation caused by any of the forms of parasites which frequent the anus and the immediate neighborhood. Abscess, or fistula, may also be caused by the laceration of the mucous membrane, resulting from costive motions and straining at stool.

Fistula in children generally results from injury to the anal region, or from worms, which should always be asked about and carefully sought for. In case of worms, medication which will remove them is likely to result in a cure.

Fistula, in the majority of cases, commences by the formation of an abscess immediately beneath the skin, just outside of the anus, starting primarily in the cellular tissue, or in the hair or sebaceous follicles. It is generally said to begin in the ischio-rectal fossæ. This is a rare situation. It may insidiously undermine the rectum in any direction. Abscess and then fistula may commence by ulceration of the mucous membrane of the bowels, as seen in phthisical patients. When they

arise in this way, fæcal matter accumulates in the parts around, and so a sinus is formed, which opens eventually outside of the anus.

Abscesses may originate in the superior-pelvi-rectal spaces, and so form sinuses extending in any direction.

Abscesses, or Phlegmons.—When superficial, the abscess presents the following appearance: There is generally a tumor the size of a hazel-nut, of a light red color, which, on examination, is found to be superficial, and limited by a circumscribed induration. At the end of two or three days, after the patient has suffered more or less pain, it becomes soft and fluctuating, the skin reddens and becomes thin, and there is a discharge of very fetid pus. The tension ceases, the pain disappears, and all that remains of the abscess is an induration. When a small abscess, however, is developed at the expense of tuberculous tissue, it often persists for some time as a small fistula.

Phlegmon is situated at the margin of the anus, and is the form which we meet most frequently. This inflammation occurs in the subcutaneous cellular tissue, but instead of being circumscribed, it has a tendency to spread over the surface. Later the patient has a sensation in the region of the anus, followed by swelling and painful defecation. Fluctuation is easily observed with the aid of one finger in the rectum, while the other is applied externally. These abscesses are frequently followed by fistula.

Rectal abscesses may be classed according to their frequency, as acute, chronic, or gangrenous. The acute will be attended with the usual symptoms of an acute abscess in any other part, only the constitutional symptoms are generally more severe. When they commence in the ischio-rectal or superior pelvi-rectal fossæ, the constitutional disturbances are very great, and predominate over the local ones, which in the early stages are indicated by tenderness and pain only, followed later on by redness of the skin and œdema. It is in these latter varieties that very prompt treatment is necessary to obviate grave after results.

The chronic variety may be months in forming, and be perfectly painless, even on manipulation, the only evidence of an abscess being a fluctuating swelling with thinning and discoloration of the skin. Again, its presence may be only shown by a flat, boggy, crepitating enlargement, which can be felt by the side of the anus. This form of abscess is said to be the most dangerous, as it is apt to be neglected. It takes some time to open spontaneously, and so burrows up by the side of the rectum to some distance, as well as under the skin toward the perineum, or buttock, or both.

All acute and chronic abscesses, if left, will eventually open spontaneously, and the patient then fancies his trouble is over. The cavity of these abscesses seldom entirely closes, but sooner or later contracts, leaving a weeping sinus with a pouting, papillary aperture, which may be situated near the anus, or far from it, and thus a fistula is formed.

Following fevers, or in patients greatly broken down in health, a

very serious condition may arise, namely, acute gangrenous cellulitis around the anus and rectum, which is accompanied by low constitutional symptoms, and ends in extensive death of the tissues in those parts. These cases are rare, fortunately, but when seen they call for free incisions, to allow the escape of the sloughing cellular tissue and putrefying pus.

It is not often one sees a rectum abscess early. Either the patient is not aware of the importance of attending to the early symptoms, or he temporizes, using fomentations or poultices. No good is obtained by the local application of iodine. The only method of treatment to be entertained for a moment is incision. It is certainly less damaging to cut into an inflamed swelling near the anus where the pus is than to let a day pass over after suppuration has commenced. The longer the abscess is left unopened, the greater the danger of the formation of lateral sinuses. Before any pus exists, rest, warm fomentations, and leeches may cut short the attack; but such a result is very rare. I will here give the technique of William Allingham's method of opening an abscess: "The patient must be placed under an anæsthetic, as an operation is very painful. I first lay the abscess outside the anus open from end to end, and from behind forward, *i. e.,* in the direction from the coccyx to the penineum. I then introduce my finger into the abscess, and break down any secondary cavity or loculi, carrying my finger up the side of the rectum as far as the abscess goes, probably under the sphincter muscle, so that only one large sack remains. Should there be burrowing outward, I make an incision into the buttock deeply, at right angles to the first. But I must here remark that in severe abscesses of gangrene one should not cut away the sloughs, but let them separate. Removing them may cause troublesome hemorrhage, as the larger vessels are kept open by the indurated and inflamed tissues. Moreover, if on removing sloughs the surrounding inflamed tissues be cut into, the lymphatics, which are blocked at the sloughed portions, may be opened, and absorption of putrid matter take place, and pyæmia may result. After the incision, I syringe out the cavity, and carefully fill it with cotton wool soaked in carbolized oil, one part in twenty. This I leave in for a day or two, then take it out and examine the cavity, and dress again in the same manner, taking great care that during the healing process the cavity fills up from the bottom. If there is any premature contraction of the external orifice, a drainage tube may be used with advantage. In a remarkably short time the patient recovers. The sphincters have not been divided, and the patient therefore escapes the risk of incontinence of fæces or flatus, which sometimes occurs when both sphincters are incised.

"After treatment, to give the patient the best possible chance of recovery, you keep the patient on the sofa, if not in bed. I always think it advisable to clear out the bowels once, and then confine them by an astringent dose of opium, for three days; you thus secure entire rest to the parts, and give every opportunity for the cavity of the

abscess to fill up. After a time the carbolized oil should be discarded, and lotions used containing nitrate of silver, copper, zinc, or Friar's balsam, which last does great good. I find boracic-acid ointment, not strong, or a solution of thymol, advantageous. You must be prepared to ring the changes between these and many other applications. Always remember never to stuff an abscess, but put in a little wool, very lightly, taking care to carry it to the bottom of the abscess cavity.

"The question naturally arises, Why do abscesses about the anus usually fail to close up? Why do they form sinuses? There are doubtless several reasons, but the following is sufficient: The mobility of the parts caused by the action of the bowels and movement of the sphincter muscles, almost at every breath, and the presence of much areolar tissue and fat; the vessels near the rectum are not well supported, and the veins have no valves; there is a tendency to stasis, and this is inimical to rapid granulation. We know that abscesses are always apt to degenerate into sinuses when situated in very movable places, and in any lax areola tissue, as in the axilla, neck, or groin. If the sinus extending from an abscess is recent, it may be lined with granulations, and the pus is healthy.

"After an abscess has long existed, the discharge loses its purulent character. It becomes watery. The abscess has gradually contracted, and now only a sinus, very often formed of dense tissue, remains. If this sinus be laid open, you may observe that its interior resembles in appearance the inner coat of an artery, so glistening and smooth has it become. If now a probe be passed very tenderly into the sinus, allowing it to follow its own course, and after this is done, the finger be placed in the rectum, you will probably find that the probe has traversed the sinus, passed through an internal opening, and can be felt in the bowel. In this case you will have a typical, simple, complete fistula; and this is by far the most common variety, very few fistulæ that have existed for more than three months being without an internal opening.

"A fistula may be a very trivial matter, indeed, which you can operate upon in the out-patient's room, and send your patient home afterward, or it may be a really serious affair, demanding extensive surgical interference. I have often seen a buttock so riddled with sinuses as to resemble a miniature rabbit-warren more than anything else.

"Fistulæ may exist for years without causing much pain or inconvenience to the patient. I have met with many persons who have had rectal sinuses for ten years and upwards, and never had anything more done than the occasional passing of a probe, when the external aperture got blocked up, and pain was caused by the formation and retention of matter.

"When the tissue around the sinus becomes very dense, there may be, for a long period, an arrest of burrowing, but an attack of inflammation setting up at any time will cause a fresh abscess. I am often

anxiously asked by the sufferers if a fistula can be cured without an operation, or, as they say, 'the use of the knife.' To this I reply that I have seen all kinds of simple fistula get well with and even without treatment; but these occurrences are quite exceptions to the rule, and should not be depended upon.

"When fistula in children is the result of worms, which is frequently brought about by the irritation they set up, a cure may often be effected without the use of a knife, by adopting the following plan of treatment. Give them every night a powder consisting of

℞: Calomel.....grs. j
Pulv. scammon co.....grs. iv
Pulv. jalapæ co.....grs. iv M.

"Administer the following enema at bedtime:—

℞: Liq. ferri perchlor... .....ʒ j
Glycerine.....ʒ j
Inf. quassia.....oj
Mix.

"And make the child take three of these lozenges during the day:—

Troch. santonini ..... grs. ij

"It is very advisable at bedtime to tie up the child's hands, so that it may not, by scratching, convey any of the ova from its anus to its mouth. This course of treatment should be continued for about one week. I have found this to be eminently satisfactory, though other means should be employed should it fail.

"When the child is rid of the worms and the irritation they occasion, the fistula frequently heals. This, I think, arises from the greater vitality and reparative power children possess.

"In the adult, if the fistula be simple, and the patient be unwilling to submit to any operation, certain methods may be fairly tried. For the last few years I have been successful, on many occasions, in curing simple blind externals, and even complete fistulæ, by means of carbolic acid and drainage tubes. This mode of treatment, if carried out with great care and some perseverance, offers, in my opinion, the best chance for the patient. I find that it is essential that the outer opening of the fistula should be much dilated before applying the acid or using tubes. The dilation can be accomplished by keeping in a small portion of sea-tangle for a few days, or by a small sponge tent. When the opening is large enough, I clean out the sinus well, and then rapidly run down to the end of it a small piece of wool saturated in strong carbolic acid with ten per cent of water. I mount the wool upon a stiff piece of wire set in a handle, and just roughened at the free end. The wool can, with a little practise, be wound tightly on the end of the wire, so as to be small enough to go right to the bottom of the sinus. I then withdraw the wire, and put in a drainage tube just large enough to fill the sinus, and keep it in. The interior of the

sinus is, by the acid, induced to granulate; and, if you are successful, you will find, almost day by day, that a shorter drainage tube will be required until the whole sinus is filled up. It may be necessary to apply the acid more than once, and to use other stimulants, as Friar's balsam, solution of sulphate of copper, or nitrate of silver, etc., but never strong injections. Care should always be taken to keep the external opening well dilated.

"I have seen many spontaneous cures of simple fistula, and have also seen an ordinary examination with a probe set up exactly the quantity of inflammation required to obliterate the sinus." The writer had one case of spontaneous cure of fistula resulting from passing the probe through it.

"Most of the cases which I have tried to cure without an operation, have occurred in private practise. The reason is that time is generally a great consideration to the poor man; he does not mind a little pain; he wants to be cured as quickly as possible, and therefore prefers to be operated upon at once, in order to get well certainly and speedily. It is only the rich who can afford the luxury of three or four months' treatment, finding themselves, perhaps, at the end of that time in much the same condition as they were when they commenced.

"Altogether, I have had about fifty cases successfully treated without the use of the knife, and a considerable number in which I failed to effect a cure after a prolonged attempt. The use of the knife is the encouraging method."

RECTO-VAGINAL FISTULA.

A recto-vaginal fistula is one which connects the rectum and vagina. The sinus may be situated in any part of the septum. In women who have borne a number of children there may be one or more openings from the rectal pouch into the lower part of the vagina. These fistulæ not infrequently result from the lesion of parturition, or they may be due to the same causes as ordinary fistulo-in-ano. In all cases where the history excludes the possibility of its being a sequela of parturition, the rectum should be carefully examined for stricture.

Symptoms.—The escape of flatus and liquid fæces will continually soil and render offensive the discharge of the vagina.

Diagnosis.—The position and size of the fistula will be determined by inspection, by its direction and length, and by the use of a probe. Where the odor of the discharge causes it to be suspected, and inspection does not disclose it, its presence may be revealed by distending the rectum with colored fluid.

Treatment.—The operation for fistula must necessarily be dependent upon its size. When it is complicated, or is caused by strictures, no operation for its closure is indicated until the full caliber of the bowel can be restored. When the opening is small, a series of flap operations may be performed, closing the opening into the rectum by buried sutures and then stitching the flap back in place.

HAEMORRHOIDS, OR PILES.

Hæmorrhoids signifies the varicose dilatation of the veins of the anus, called piles. It is said that almost from time immemorial hæmorrhoids have been divided into two varieties, viz., the external and the internal, often also popularly called blind piles and bleeding piles. And this classification is founded upon a true pathological distinction; for, although it may be correctly said that external piles may and do encroach upon the mucous membrane, and so are partially internal, and, further, that internal piles, by reason of frequent prolapse, become more or less external, yet in the majority of cases the difference is well marked, and precludes the slightest doubt as to the diagnosis.

In the external form the observer will perceive that they are either true hypertrophies of skin, exaggerations of some natural rugæ around the anus, or round or elongated venous-looking tumors, which are situated at the verge of the anus or pass up into the bowels.

In the internal kind, you will observe that they are tumors originating within the anus, but can be forced down outside, and even may have put on a pseudo-cutaneous appearance from exposure, having been, for more or less time, subjected to the same conditions as the skin. You may also find a combination of these two classes, viz., complicated piles, and internal piles may join hypertrophied rugæ.

To clear up any doubt as to the true diagnosis, place the patient on the side, instruct the patient to draw the knees up toward the chest. Now, by gentle pressure, return within the sphincter-ani all the protruded part that you can, at the same time directing the patient to retract, or draw up, the lower gut. You will then find out what is redundant skin, and what is internal hæmorrhoid and prolapsed mucous membrane of the anus. If all can be reduced, it is a case of internal piles. If none, it is a case of external piles. Should only a part of a pile be returned, and the rest remain outside, it is a combination of both varieties, and must be considered as internal piles, and treated like them. All these kinds may coexist in the same patient, and then they are to be treated as internal and external piles.

External Haemorrhoids.—These affections are so prevalent that very few persons, either male or female, arrive at middle age without having in some degree suffered from them. They occur almost equally in the robust and the weakly, in the rich and in the poor, in the active and the sedentary. No doubt some occupations and modes of life conduce, more than others, to the production of external hæmorrhoids. Still I repeat, there is no class of society or state of constitution which can be said to be entirely exempt.

The skin around the anus and the mucous membrane at the verge of that aperture are remarkably delicate in structure. They are also profusely supplied with nerves and small vessels. From these facts it arises that anything tending to irritate that region may readily

cause congestion and inflammation of the part, and result in an attack of the piles.

Obstruction of the liver or portal system, pulmonary or cardiac affections, or anything rendering the return of blood from the rectum difficult, are likely to conduce to the same end. From this we can readily see that a great variety of causes may bring on an attack of piles. The following may be mentioned: Too high living, especially the consumption of too large quantities of meat, very coarse fare, indulgence in alcoholic drinks, excessive smoking, violent and prolonged exercise, sedentary occupations, or exposure to wet or cold. Other causes are fæcal accumulations, constipation, often associated with chronic spasms of the external sphincter, diarrhea, discharge from the bowels resulting from internal diseases, the pressure caused by the uterus during pregnancy, or uterine displacement. Again, sitting on damp seats, friction from clothing, excoriations and irritations, the neglect of proper ablutions; this is very important; many persons seem to forget that the anus requires quite as much washing as any other part of the body, or even more; straining, however induced,—all these are among the common causes, predisposing or exciting, of external hemorrhoids.

We have already said that two varieties of external piles may be recognized. The first is the so-called hypertrophies or excrescences of the skin; the second, sanguineous venous tumors. When you look at either of these in an uninflamed state, you would think them harmless enough. In the one case you will observe around the anus merely a certain redundancy of the skin, forming little flaps or tags, more or less pendulous, in addition to the small radiating corrugations seen in the normal state. In the others you perceive blue veins, rather raised above the surface, and running up into the bowels, resembling, indeed, varicose veins. Now, these conditions, so innocent in their appearance, are prone, at a trifling provocation, to take on an active inflammation, and to cause the patient an amount of suffering quite disproportionate to the pathological appearance.

There is a difference of opinion as to the formation of these tumors. Why, I do not understand, for the rectal veins are similar to veins in any other part of the body, and in like manner may become varicosed and inflamed.

A rectal vein becoming varicosed is tortuous and dilated in parts. From some constitutional or local cause, a clotting of the blood in the vein may take place, giving rise to simple thrombosis, hence the tumor. This may remain quiet and cause no pain, but only discomfort. Again, inflammation may start around the vein, or in its coats, occasioning periphlebitis, or phlebitis. This is the painful kind of sanguineous or external pile, and may subside or suppurate.

In rarer cases, or in other situations, a rectal vein may become weak at one point, and cause a small aneurism of the vein, in which coagulated blood is contained.

It is very advisable for all these sufferers to notice the earliest or rather the premonitory symptoms of one of these attacks, as by this knowledge it may possibly be warded off, or at all events much mitigated. Not infrequently a little extra eating and drinking, without any absolute excess, is the exciting cause, an indulgence in effervescing wines or full-bodied port wine, or new spirits, being especially dangerous.

The earliest symptom is a sensation of fulness, or plugging up, and slight pulsation in the anus. There is also a tendency to constipation, inducing a little straining. This is frequently followed by itching of an annoying character, coming on when the patient gets warm in bed, keeping her awake for some time, and inducing her to scratch the part. In the morning the anus will be found a little swollen and tender, and if the patient be an observant person with regard to herself, she will notice after a motion a slight stain of blood. Now, all this may pass off with the simplest care and the slightest medication, but if patients neglect themselves, it will surely be the precursor of a more or less severe attack. The palliative treatment in such cases should be abstinence from active exercise, rather spare diet, well-cooked vegetables and fish, milk and eggs, not much meat, chicken or quail are allowed, no beer or spirits, and wine is not desirable. If the patient must take some stimulant, a small cup of black coffee, or a glass of light claret, Seltzer, or Vichy or Vals water, will be the best beverage. If the patient is a smoker, the allowance must be cut down below the usual indulgence. Smoking is said to cause a sympathetic irritation of the throat and rectum. A warm bath or a Turkish bath should be taken three times a week, besides washing the anus night and morning with warm water and castile soap. After this apply one of the following ointments:—

℞: Acidi tannici-glycerinum.

Apply twice a day.

℞: Bismuth sub-nitratis.....ʒ ij
Hyd. sub-chlor.....ʒ j
Morph. acetatis.....grs. iv
Vaseline.....ʒ j

M. Sig.: Use night and morning by anointing the anus thoroughly.

℞: Liq. plumbi sub-acetatis.....ʒ j
Liq. opii-sedativi.....ʒ ss

M. Sig.: One teaspoonful of the lotion to be mixed with a wineglass of milk and frequently applied to the anus. This is very soothing.

As to medicine, the patient may take

℞: Pil. hyd. sub-chlor. comp.....grs. ij
Ext. belladonna.....grs. ⅙
Ext. taraxaci.....q. s.
M. ft. pil. j.

Or,

℞: Podophyllin.....grs. ¼
Ext. nux. vom.....grs. ss
Ext. belladonna.....grs. ¼
M. ft. pil. j.

Sig.: Three times a day, and in the morning fasting. Take some effervescing citrate of magnesia, in water, every morning.

The following draught I have found to be very useful on many occasions:—

℞: Liq. mag. carb.....℥ ss
Potassa bi-carb.....ʒ j
Syrupi sennæ.....℥ ij
Spt. ætheris not.....℥ ss
Aquam ad.....℥ ij
M. et sig.

Or,

℞: Mag. sulphas.....℥ j
Potas. nitratis.....grs. xv
Syrupi sennæ.....℥ ij
M. et sig.

To be taken every morning after the pills have been taken during the day.

If the case be neglected, and advice is not sought, active inflammation will set in, and the symptoms will be as follows: When the piles are formed of hypertrophied skin, the small tags will be much increased in size. They may be very swollen, œdematous, and shiny. They are exceedingly painful to touch. Sometimes they ulcerate, or suppuration may take place if the inflammation runs very high, and hence small but painful little fistulæ arise. At times the œdema is so considerable as to extend into the bowels, and form a large swollen ring of skin, and everted mucous membrane all around the anus.

In regard to the sanguineous venous hemorrhoids, they are swollen into ovoid or globular bluish tumors, very hard, and exceedingly painful. They can be pinched up between the fingers and the thumb from the tissue beneath, and they feel as if a foreign body were there. Sometimes, but rarely, they can, by gentle pressure, be emptied of their contents; but this proceeding is not followed by any benefit to the patient, as in a few hours they become larger and more painful than before; moreover, the attempt to empty them is extremely dangerous, as a clot may be discharged and fatal results ensue. These tumors may be simple, or two or three may be present at the same time. By irritation they set up spasms of the sphincter and levator-ani muscles, so that they are drawn up and pinched, thus adding much to the patient's suffering. Just as the patient is falling to sleep, a spasm takes place, and wakes the patient up. In addition, there is a constant

throbbing, and the sensation as if a foreign body were thrust into the anus; this excites the desire, every now and again, to attempt to expel it by straining, which, if indulged in, of course aggravates the pain. Often the patient can not sit down, save in a constrained attitude, nor can she walk when she coughs, as the succussion causes acute suffering. When the bowels act, and for some time afterward, the distress is greatly increased, and the patient, if not absolutely confined to bed, is quite incapable of attending to any business. Accompanying all this there is general feverishness, furred tongue, and usually constipation. Such, then, are the symptoms of an acute attack of external piles; and, if not a serious matter, it is one of great worry and loss of time, an important point in these hard-working days. Moreover, one invasion predisposes to another. I have known many patients who periodically suffer what I have described; besides, the writer has suffered all this, and positively knows that an operation will cure the patient of these lesions after all other measures fail.

Treatment.—If the patient will not submit to an operation, the following may be used:—

℞: Ext. opii
Ext. belladonna.....aa ʒ j
M. et sig.: For external use, night and morning.

Smear a little over the swollen parts externally, and apply a warm flaxseed poultice. This in many cases gives very speedy relief, and, as a rule, is much more efficacious than cold applications; but sometimes cold applications are found to be much more soothing. In that case, apply the lotion of lead and milk already mentioned, or,

℞: Liq. plumb. sub-acetat. dil .....ʒ j
Liq. ext. opii.....ʒ iv
Tinct. belladonna.....ʒ ij
M. et sig.: Apply night and morning externally.

This is very useful. Ice may be pretty constantly applied.

The galvanic current of electricity, anode placed on the protruding pile, having first cocained the tumor; the cathode is placed over the sacrum; give from thirty to fifty milliamperes; seance fifteen minutes; this will give relief. The tags protruding from the rectum can be successfully removed by electrolysis, and rest in bed, which patients will often submit to when they will not let a knife be used.

Treatment to Prevent the Recurrence of Piles.—I have said that one attack of hæmorrhoids predisposes to another. It is, therefore, very advisable for the patient so to live, if possible, as to ward off this repetition. Generally the patient should eat sparingly, and fish, poultry, eggs, milk, fresh-cooked vegetables, and ripe fruit should form a considerable part of the diet. Spirits and beer should be avoided, and as little stimulants taken as possible. Very strong coffee and

highly-seasoned dishes must be abstained from. Smoking must not be permitted, or must be indulged in very moderately. The patient should take plenty of walking exercise, but the exercise should not be violent, nor continued to over-fatigue. She should lie down after exercise, instead of sitting. Never omit to wash the affected parts night and morning with very hot or cold water, whichever is the most comfortable to the patient. Lastly, the bowels should be kept open, acting daily. If the latter object can not be accomplished without some medicinal aid, the following is a capital remedy:—

℞: Conf. pip. nigr.
Conf. sulph.
Conf. sennæ, aa equal parts.....ʒ j
M. et sig.

Of this one or two teaspoonfuls may be taken in water every morning, or night and morning, if required.

Another remedy is admirable, pulv. licor. comp. drs. j, taken in a wineglass of water, twice or thrice in a week, at bedtime, or the use of one of the mild purgatives I have already mentioned. A steady perseverance in the line of treatment I have suggested, will, in all probability, eradicate the hæmorrhoidal tendency in many cases.

INTERNAL HAEMORRHOIDS.

All the causes I have mentioned as likely to induce external piles, tend also to the production of internal hæmorrhoids; but in addition we may mention diseases of the genito-urinary system, the state of recovery from childbirth, and hereditary influences. Although constipation is a very general cause, yet piles may occur without any constipation, and be as much of a family idiosyncrasy as any other disease.

During pregnancy external venous hæmorrhoids are frequent, and these may, and often do, pass away after labor, in common with varicosities of the leg and labia vagina. But the reverse is the case with regard to internal hæmorrhoids. These most frequently make their appearance after parturition, when all the parts are relaxed, and uterus-involution is going on. I will not attempt to give any reason for this peculiarity.

Internal piles present several varieties in appearance, position, structure, and other characteristics. Three broadly-marked kinds may be observed, viz., the capillary hemorrhoids, the arterial hemorrhoids, and the venous hemorrhoids; at times all perfectly distinct, at other times united in the same patient.

Capillary.—This first variety is described as small, florid, raspberry-looking tumors, or rather vascular areas upon the mucous membrane, having a granular, spongy surface, and bleeding on the slightest touch. These piles are often situated rather high in the bowel.

Arterial.—Arterial internal hæmorrhoids may be described as tumors varying in size, sessile or somewhat pedunculated, attaining sometimes very considerable dimensions, glistening or slightly villous

on the surface, slippery to the touch, hard and vascular, with an artery, often as large as the radial, entering their upper part. When they are villous on the surface they bleed very freely, and for some reason or other have formed and grown very rapidly.

Venous.—The venous is the third variety, called the venous internal hæmorrhoid, and in this the venous system predominates. The tumors are often large. Sometimes they are the size of a hen-egg. They are bluish or livid in color, and they are hardish. The surface may be smooth and shiny or pseudo-cutaneous. It may be well, right here, to quote from Professor Richet, of Paris, who at the Hotel Dieu delivered a lecture on what he termed the "white piles," hæmoroides blanches, as they did not discharge blood like ordinary internal hæmorrhoids, but a sero-mucous fluid. The professor stated that the white piles are merely ordinary piles in a more advanced stage, consisting principally of the papillary bodies of the mucous membrane. The incessant discharge acts as perniciously as frequent bleeding, being nothing more nor less than transformed blood, and he advises them to be operated on in the usual way.

Partial prolapse of the mucous and submucous membrane of the rectum may very much resemble but is not actually a pile. It differs from a pile in that there is no tumor. It is neither hard, smooth, nor shiny, but soft and velvety, and does not consist of hypertrophied or dilated arteries or veins.

Capillary Haemorrhoids.—These are so small and so little elevated above the mucous surface that they give no trouble by their size, and rarely protrude on going to the closet; moreover, there is no pain, unless there be a complication of ulceration. Although they are so insignificant in size, the quantity of arterial blood lost from them, though small at each action of the bowels, is so continuous as to occasion a serious drain upon the patient's constitution. I have seen persons quite blanched by the losses they sustain.

The persistent arterial hæmorrhage caused by these capillary and also by the arterial piles is far more exhausting than venous hæmorrhage from venous piles. The loss of blood from the venous system often relieves, when the former in time always depresses.

On examination of a patient suffering from these piles, there is little or nothing to be felt that is abnormal, and they can only be diagnosed by their symptoms and ocular inspection. These patients complain of frequent pains in the back and loins, also, in the male, in the spermatic cord and testicle. They have great lassitude, and not infrequently the sexual power in both sexes is interfered with.

It is these daily small losses which are apt to be overlooked, and which female patients accustomed to their monthly discharges scarcely think worthy of mention, but which, when added to menstruation, becomes a serious matter, and speedily induces chlorosis and an amount of debility which can be combated only by removing the primary cause of the malady. Very tiresome constipation is usually found attend-

ant upon this condition and often continues after the patient has recovered her general health. It is only to be overcome by the patient's attention to diet, exercise, and the administration of such medicines as give tone and gently stimulate the colon, without irritating or purging.

I have found faradization a valuable aid to other treatment. The anode is placed in the rectum, and the cathode over the sacrum. Give the amount of current that the patient can comfortably bear without pain.

I have used linseed oil and the spirits of turpentine,—one dram of spirits of turpentine and four ounces of linseed oil. Inject a few drops, with a dropper, night and morning. Keep the rectum cleansed with warm water and castile soap. This will cure most cases of capillary piles, fissures, and is beneficial to ulcers of the rectum. It has the advantage of being cheap, a few drops only being needed for each application. Fuming with nitric acid is recommended by some specialists for the cure of capillary piles. Carbolic acid in one to twenty in oil or vaseline, is very useful. Make a topical application once every two or three days. The following ointments for the capillary piles is a very good astringent, which is necessary for these conditions:—

℞: Ferri. sub sulphatis.....ʒ ss to ʒ j
Vaseline.....ʒ j

M. et sig.: Use a little two or three times a day after cleansing the anus and rectum with warm water.

An injection into the bowels of one dram of hamamelis twice a day, or the occasional application of chromic acid to the piles, is recommended. These act as most powerful astringents, not as cauterants. They cause little or no pain. With these remedies cures can be effected in many cases where an operation is not desirable, or when a patient is too nervous to submit to one.

There are many symptoms common to both the second and the third variety of internal hæmorrhoids, the arterial and the venous hæmorrhoids. The suffering occasioned is more directly associated with the condition of the hæmorrhoid itself as to inflammation or ulceration, and with the state of the sphincter-ani muscles, a relaxed condition, such as frequently exists in women and men of lax fiber, allowing the protrusion of even small hemorrhoids on the slightest exertion. This is especially noticed in women who have borne children. In the earlier stages of the complaint, when piles come down at stool, they nearly always bleed; but they spontaneously return within the sphincter after the bowels are emptied, or upon the patient resuming the upright position, or, at all events, upon lying down and voluntarily retracting them, and then the bleeding ceases. Later in the progress of the disease, the patient is compelled to return them by pressure, and then they keep up. But later on, in advanced cases, although returned, they will not remain in place if the least exertion

is made. In this way alone they cause discomfort. They also discharge a gummy, acrid mucous, watery when constant, viscid when at stool, which keeps the part constantly damp, leads to excoriations around the anus, stains the linen, and on this account is a source of great annoyance to sensitive, delicate-minded persons. Generally after visiting the water-closet, it is some time before the patient can become at all comfortable; often she has to lie down, and when she walks about she is almost always aware of the fact that she has a rectum. She scarcely ever feels that her bowels have been properly relieved, and this feeling often leads to the closet, and attempts to procure satisfaction by straining, which ultimately aggravate the malady.

The condition of the sphincter-ani muscle plays an important part in causing distress. If it be strong and tight, as is often seen in strong, muscular persons, when the piles come down they get nipped, and their return is rendered difficult and painful. On the other hand, if the sphincter is lax, the bowels are constantly coming outside on the slightest exertion, as in coughing, stooping, or even walking; and in these cases when the bowels are down, the patient can seldom retain liquid fæces. Constipation adds greatly to the severity of the symptoms, and so also does habitual relaxation, which, by causing frequent protrusion, induces inflammation and ulceration of the part.

These advanced hæmorrhoids are almost always associated with cutaneous hypertrophies around the anus, and these being irritated by the discharges, become inflamed and very tender. I have seen cases who had excrescences or small polypoid growths studded over the mucous membrane around the anus.

If an examination is made of a patient suffering from arterial or venous hæmorrhoids, distinct tumors well be felt bulging from the rectal wall, with a well-marked sulci between them, and on slight outward pressure of the finger one of them may be made to protrude. If scratched, they bleed freely. In the arterial, the blood issues per sultum; in the purely venous pile it only oozes out and runs away. These tumors vary considerably in size, even in the same patient. Some are quite small, others as large as bantams' eggs.

Differences between Arterial and Venous Piles.—The arterial piles are not so much dependent on constitutional causes, being more particularly a local disease. They are affected by any excess in diet, etc., and are, therefore, less amenable to palliative treatment. The tumors are not generally so large as in the venous pile. They have a great tendency to bleed, the blood being of an arterial character. They have not the same tendency to prolapse as the venous, and the sphincters, as a rule, are tighter, rendering the return of the pile more difficult.

The venous piles, as I have already implied, generally result from constitutional causes. Constipation plays a great part both in producing and aggravating them. They are commonly found in women

who have borne many children, and who have an enlarged or retroverted uterus. They often occur about the change of life. They are also seen in men with enlarged or indurated livers, in whom the portal system is constantly engorged, and the circulation through the abdominal viscera is obstructed. This is said to be the form the spirit-drinkers get.

The tumors are always large. They do not bleed much, but when they do the hemorrhage is venous. They prolapse very considerably, and constantly come down upon the slightest exertion.

Treatment.—Operative procedure is absolutely requisite to obtain any permanent benefit. In patients who refuse to submit to such radical treatment, some of the ointments or lotions used for the treatment of capillary piles may be tried.

It is in the venous kind of pile that palliative treatment is most likely to be successful, not in always curing the disease, but in materially alleviating it, as the malady often depends upon uterine or liver affections, and a generally overloaded and congested condition of the system found in those who habitually eat and drink too much, and who take but little exercise. These causes may, to a great extent, if not altogether, be removed, and if they are, the hemorrhoidal disorder will be found to be benefited to an equal degree.

Dr. Allingham recommends a prolonged course of Friedrichsall and Carlsbad waters. He also recommends the oil of sandalwood to be taken in conjunction with such remedies as will relieve congestion of the portal system, and depurate the blood generally.

The following prescriptions are commonly used:—

℞: Pil. hydrarg.....grs. jss
Pulv. rhei.....grs. jss
Ext. col-co.....grs. jss
Oil juniperi.....m. j

M. et. sig.: One to be taken at bedtime. This is one dose.

Or,

℞: Mag. sulph.....ʒ ss
Pot. nitratis.....grs. xv
Liq. ammon. acetat.....ʒ ss
Liq. ext. cinch. flav.....ʒ ss
Dec. glycyrhizæ.....ℨ j

M. et. sig.: To be taken two or three times a day. One dose.

℞: Ammon. chlorid.....grs. iij
Podophyllin.....grs. ss
Ext. nux vom.....gr. ¼
Ext. belladonna.....gr. ¼

M. et. sig.: One pill at bedtime. One dose.

Or,

℞: Soda sulph.....ʒ j
Mag. sulph.....ʒ ss
Acid. nit. dil.....m. x
Succi tarax.....ʒ j
Inf. calumb.....ℨ j

To be taken two or three times a day.

The patient should be careful as to her diet, which must not be stimulating in character, and should be almost devoid of alcohol. After the action of the bowels, a small injection of cold water should be administered. In some cases hot water agrees best, injected after the bowels move, to thoroughly cleanse the rectum, before anointing the piles with astringent ointments, as follows:—

℞: Galls nut.....ʒ j
Pulv. rhatany.....ʒ j
Ext. opii.....grs. x
Ext. belladonna.....grs. x
Vaseline.....℥ jss
M.

℞: Acidi tannici.....grs. x
Vaseline.....ʒ j

M. To be used night and morning.

℞: Galls nut.....ʒ ss
Ext. opii.....ʒ ss
Ex. trhatany.....ʒ ss
Spermaceti.....℥ ss
Vaseline.....℥ ss

M. et. sig.: To be used night and morning.

℞: Ferri-persulphate.....ʒ ss
Spermaceti.....℥ j
M.

℞: Acidi tannici.....grs. xx
Morphia sulph.....grs. v
Ext. belladonna.....ʒ j
Ext. stramonium.....ʒ jss
Unguent-petrolei.....℥ ij
M.

Use per rectum, night and morning.

Dr. David Young, of Rome, has recommended glycerine to be taken internally as an effective remedy in hæmorrhoids, even in advanced cases.

The so-called "white piles" and partial prolapse of the mucous membranes of the bowels, are the arterial and venous piles that have attempted to cure themselves; that is to say, they are hard, non-vascular, and do not bleed.

The palliative treatment should be that peculiar to the species that happens to be predominant. Some of the astringent ointments already prescribed may be tried, but for a permanent cure they must be ligated.

The inflamed pile or piles so commonly found in every-day

practise, that are constantly coming down and getting compressed by the sphincters, are those which give great pain to the patient.

When called to a patient whose piles have just come down and can not be returned, proceed in this way: Place the patient on her face, with three or four pillows under her pelvis, to raise the hips well up, to allow the intestines to gravitate toward the chest, or put the patient in the knee-and-chest position, which in some instances may be better; then apply to the pile a piece of wool saturated with a twenty-per-cent solution of cocaine, and allow it to remain on the pile for ten minutes; then pass a well-anointed finger into the bowel, and with the other hand apply pressure, trying to empty the piles of their superfluous quantity of blood. In some cases where there is no more than one pile, hot fomentations applied constantly, while in the knee-and-chest position, and a little carbolized vaseline applied after they have been treated with hot fomentations for five or ten minutes, will give relief. The pile or piles can be very gently reduced by this method. In some very stubborn cases it may be necessary to use cold applications, or ice wrapped in flannel, to the part, for an hour before the piles can be made to pass back within the bowels. All these cases are permanently cured by an operation. If they can be returned, but immediately prolapse again, do not attempt to keep them above the sphincters, as it is useless and harmful.

One of the following ointments and warm linseed poultices covering the lint may be used:—

℞: Unguent elemi.....℥ ss
Ungt. sambrici.....℥ ss
Bal. copaiba.....℥ j
Ext. belladonna.....℥ ss
M. et. sig.

℞: Ext. belladonna.....℥ j
Ext. hyosciami.....℥ ij
Ext. conii.....℥ ij
Vaseline.....℥ j
M. et. sig.

By the warmth and the ointment, profuse suppuration is caused, and a separation of the slough quickly procured.

If the patient is much depressed, stimulants and tonics will be necessary, but the general treatment must be regulated according to the character of the constitutional disturbance.

In uterine diseases where women are suffering from a retroverted or antiverted uterus, an operation is very unsatisfactory. The uterus should be restored to its normal position and size prior to an operation upon the piles; and when this is done, the rectal affection will soon become a comparatively small matter.

There are various methods of treatment for the removal of piles. Some of the best methods are: First, excision; second, ligature; then

removal by clamp and scissors and cautery, applying the actual cautery to arrest hemorrhage. Dilatation of the sphincter muscle is a very popular as well as safe method in chosen cases. Removal by the galvanic cautery wire is also becoming useful; also removal by means of the screw crusher. The operator chooses the method best suited to his or her case.

My advice to every person who is suffering with this malady is to be operated upon and be relieved, permanently, from the constant or periodical attacks of suffering.

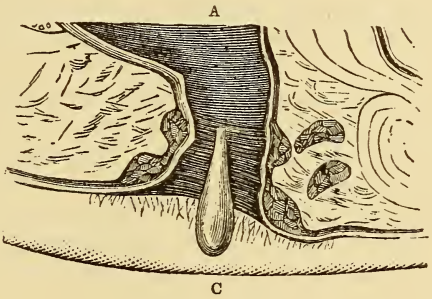


Fig. 23.—Polypi.

Polypi.—This means a peduncled growth. Polypus was formerly looked upon as a very rare disease. The polypi are usually few in number, and in the adult it is rare to find more than one. Though generally of small size, they sometimes become as large as a prune, or even a hen's egg. The size of the growth is dependent upon the blood

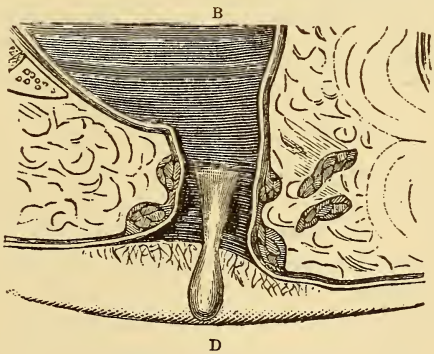


Fig. 24.—Polypi.

supply. It has generally been believed that polypi are much more frequent in children than in adults. This has not been my experience. This may be explained, in that children shed their polypi. The tumor is usually of a rounded form, and is dependent by a slender pedicle. Polypi is commonly situated about an inch to an inch and a half above the anus; occasionally they are said to be found six inches high in the

rectum. Their most common seat is a dorsal portion of the rectum or posterior wall of the gut. The pedicle may be round or flattened. It is large and short in the fibrous variety, long and slender in the soft ones.

The Soft or Gelatinous Variety.—The polypi are small vascular tumors, with a peduncle often two inches long. They are near the size of a raspberry, and resemble a small half-ripe mulberry. I had one case, a young girl's, where the polypi resembled a red raspberry more than anything else. They bleed very freely at times, and occasionally in the young cause great debility. They are said to be hypertrophies of the glands of Lieberkuhn, or of the mucous follicles of the rectum.

Such a growth may exist for a long time without causing any suspicion of its presence. The patient may be aware of its existence only when a tumor appears at the anus. It may produce a series of phenomena, as severe pain during defecation, tenesmus, twitching, and mucus, and a fleshy mass protruding from or appearing at the anus pelvis. Besides, there is a glairy mucous discharge, and sometimes blood. The general health remains good unless the hemorrhage is so great as to cause anæmia to be induced.

The usual symptoms in children are frequent desire to go to stool, accompanied by tenesmus, occasional bleeding, with discharge of mucus, and a fleshy mass protruding from or appearing at the anus when the bowels are acting. They are most usually described by mothers as piles, or as "the body comes down."

They may be dangerous when high up by causing intussusception of the bowels, with obstruction and death.

Diagnosis.—The diagnosis is easy. First pass a well-anointed finger its full length into the rectum, and gradually withdraw it, sweeping the finger around the entire rectal surface. By so doing the finger will hook the pedicle, and your diagnosis is made. On the other hand, were you to examine from below upward, the tumor might be pushed out of reach.

It is possible to mistake the disease for internal piles, procidentia recti, or dysentery. An examination after an injection will clear up the doubt in the first two cases; in the last, the presence of fever, the abdominal pain, and the appearance of the motion are sufficiently distinctive indications as to the differential diagnosis.

Treatment.—The treatment to be recommended is the removal of the growth. It is not safe to cut or tear off a polypi, as troublesome arterial hemorrhage may ensue. Ligature is certainly the safest method. The polypus should be seized and drawn down; then pass a needle through a small piece of the mucous membrane only, at the base of the pedicle. Now tie a single knot, after which surround the pedicle with the ligature and tie up tightly, then cut off the polypus. By securing the pedicle in the above manner, there is no danger of bleeding, or of the ligature slipping off when the bowels act. The

patient should rest in bed until the ligature separates, and I usually order a mild astringent draught to keep the bowels confined for three days (will add that I always have the bowels thoroughly cleaned out with some saline laxative before ligating the polypi), then I order an aperient, and upon the movement of the bowels the ligature will come away. The patient's rectum should be washed out with warm water. At the end of a week the patient can resume his usual work.

POLYPOID GROWTHS.

By polypoid growths are meant small growths protruding from the mucous membrane of the rectum, but not absolutely pedunculated. They rarely protrude outside of the anus. These growths are of great importance, as they occasion or keep active several diseases of the rectum, as pruritus-ani and fissure. It is only by removal of these polypoid growths that the above-mentioned ailments can be combated. There may be noticed two varieties, both of which must be carefully distinguished from warts, which chiefly affect the outside of the anus, and are presently to be described. One kind of polypoid growth consists of little tags of mucous membrane, with the apex pointed and hard.

Symptoms.—It is rarely the case that patients come for consultation about the growths themselves; they only complain of the symptoms occasioned by them, viz., discharge of the anus, which causes fissure or pruritus-ani. They can be felt by the finger or seen by means of a speculum.

Treatment.—They should be removed by the galvanic current of electricity. Pass a platinum needle through the base, using the anode, passing the cathode through the apex, first cocaining the parts thoroughly. Generally fifteen to thirty milliamperes or less is sufficient to turn the tags white, or they will become blanched looking, which is sufficient to shrink them up. Some operators do not take that trouble, but snip them off, and they rarely bleed much.

WARTS.

Warts around the anus may be the same as warts in other parts of the body,—sessile or pedunculated. The peduncle may be single or multiple, the surface smooth or branched.

They may arise like other warts, from a natural predisposition in the patient, or they may follow on gonorrhœa, leucorrhœa, discharges during pregnancy, or, in fact, on any watery discharge. They rarely extend into the rectum, being chiefly confined to the parts around the verge of the anus.

Treatment.—The most excellent treatment is the galvanic current. Put the cathode over the sacrum, and pass the electric needle just underneath, or within the base of the wart, giving from ten to twenty milliamperes, if necessary, to turn the wart to a whitish color. It usually takes from one to three minutes, dependent upon the strength

of the current. Reverse the current for a few seconds, and remove the needle. Treat each wart likewise until all have been treated. The parts should be first thoroughly cocained with a twenty-per-cent solution, for at least fifteen minutes, using absorbent cotton dipped in the cocaine and laid over the warts. I have treated as many as ten to fifteen at one seance. I have never had to repeat the operation. It takes a few days for the warts to disappear by this operation or plan of treatment. It is necessary to keep the anus cleansed with castile soap and warm water, after which apply oxide of zinc ointment until well.

Most surgeons recommend the application of fuming nitric acid to each wart, and at the same time to scrape them off with the end of a wooden match. When this has been done, the acid should be applied to their bases. This causes little pain, and is a speedy cure.

PROCIDENTIA RECTI AND PROLAPSE OF THE RECTUM.

There is said to be confusion of ideas sometimes, occasioned by the use of the words "procidentia" and "prolapsus." The distinction is

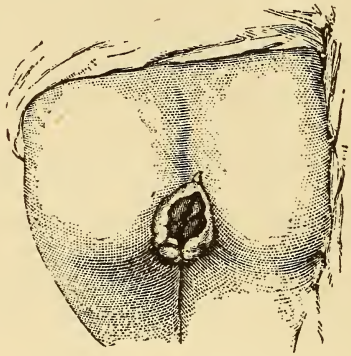


Fig. 25.—Procidentia.

thus pointed out by Dr. Allingham: "They are very different in appearance, and hence it is most important to retain the two names, for by so doing we thoroughly understand what affection we are speaking about. Moreover, the best operative methods for obtaining a radical cure of the two diseases, are very different from one another. Prolapse, as I shall describe it, may best be treated by excision, whereas procidentia requires the use of actual cautery.

"By prolapse, I mean a protrusion from the anus of a portion or portions of the mucous membranes, not in its entire circumference, and unaffected by piles.

"External hemorrhoids, when they come down outside the anus, are said to be prolapsed hemorrhoids.

"To these two conditions only, would I restrict the term prolapse. They may and should be cured by removal.

"I would confine the term procidentia to a descent of the whole circumference of the rectum. This may take place in three ways:—

"First, when the entire circumference of the mucous membrane, or all the coats of the rectum, appear outside the anus.

"Second, when the upper part of the rectum descends through the lower part, and then appears outside the anus.

"Third, when the upper part of the rectum descends through the lower part, but does not appear outside the anus.

"These two latter conditions are kinds of intussusception, but would better be described as forms of procidentia."

Procidentia, when it occurs, as is represented in diagram 25, presents the following symptoms:—

When the bowels act, the mass protrudes, and in old cases frequently bleeds. Constipation is the usual symptom in children, but in the old, an "objectionable," teasing diarrhea is more commonly present. There is then often a discharge of mucus. In children the mass only, as a rule, protrudes on going to stool, but in adults it is down or coming down on the slightest exertion, and therefore may become ulcerated or inflamed.

In very old or bad cases of procidentia, more or less incontinence of fæces always exists. As I have before said, there may be two reasons for this symptom: First, loss of tone in the sphincter, the frequent protrusion stretching these muscles so that they lose a great deal of their contractile power; and, secondly, the mucous membrane gets so altered in structure as to lose, in a great degree, its natural sensitiveness. Thus, when fæcal matter comes into the lower part of the rectum, the sphincters are not stimulated to action, nor is the patient aware of its presence.

Procidentia varies greatly in size. It is sometimes very large. I have seen it in a woman larger in circumference than a fœtal head, and seven or eight inches in length.

In the third kind of procidentia, the symptoms are as follows: There is no protrusion of the mass from the anus. There is generally obstinate constipation, unrelieved by purgatives; sensation of fulness in the bowels, attended with burning and tenesmus, straining difficulty in defecation, with occasional discharge of blood and mucus.

Diagnosis.—The diagnosis of the first two kinds is obvious. The third variety is not always easy to diagnose, as the mass never appears outside of the anus.

How to Examine the Patient.—The bowels having been previously washed out, direct the patient to stand up, introduce the finger into the bowel, and then, keeping the finger close to the anterior or posterior wall, pass it up until you meet with an obstruction, *i. e.*, it has passed into the cul-de-sac; then withdraw the finger slightly, and examine the center of the gut until you find the orifice, into which the finger or a bougie may be passed for some inches, high up into the rectum,

telling the patient to bear down if the intussusception is rather far up in the rectum.

Procidentia of the rectum is more often seen in children than in adults, although by no means is it a rare affection in women, especially those who have borne children. It is also seen in men of advanced years. Procidentia in children is much favored by the formation of the pelvis, the sacrum being nearly straight. All infants strain violently when their bowels act, even when their motions are quite soft. These facts, why infants or children are prone to this malady, are not quite understood. There is always in addition some inherent weakness or extraneous source of irritation present by which excessive straining is caused. We may mention diarrhea, often the result of strumous inflammation of the intestines, worms, stone in the bladder, phimosis, polypus-recti, etc. There are many cases, however, in which we can not assign any special cause, where the children are not manifestly unhealthy, and no source of irritation can be detected. It is believed that the very bad custom of placing a child upon the chamber utensil, and leaving it there for an indefinite period, as practised by many mothers and nurses, is a fertile cause of procidentia.

Dr. Allingham thus describes his method of returning procidentia: "Sometimes when a large portion of the bowel comes down, there is much difficulty experienced in returning it. I have found on several occasions that the passing up the bowel of a large, flexible bougie, so as to carry before it the upper part of the descending gut, is of great service. Gentle taxis should at the same time be used, and in this manner the mass can generally be returned. When the gut comes down, and the patient can not get it back, and does not seek assistance, it gets tightly girt about the sphincter, great swelling takes place, and sloughing may ensue. I have seen many cases of this kind, but as far as my experience goes, the sloughing is partial, and only the mucous membrane separates. After a few days' rest, with the buttocks well raised to favor the return of the blood, the part can be replaced, and considerable benefit may result. Care should be used in the application of ice in these cases, as it favors sphacelin, causing extensive sloughing, and there may be caused free secondary hemorrhage; also, a very intractable stricture may result.

"*Hernial Sack in Procidentia.*—Directly the bowel is protruded, you can tell that there is a hernia also present by the fact that the opening of the gut is turned toward the sacrum. When the hernia is reduced, the orifice is immediately restored to its normal position in the axis of the bowel. I have seen several cases in the practise of my colleagues at St. Mark's; the condition is therefore not very uncommon, but I have never found it in children."

Treatment in Children.—Palliative treatment is generally successful. It should first be addressed to the removal of any source of irritation; this accomplished, a cure is speedily effected. When no source of irritation can be discovered, the general health must be

attended to. The child should never sit and strain at stool. The motion should be passed lying upon the side at the edge of the bed, or in a standing position, and the buttock should be drawn to one side, so as to tighten the anal orifice while the fæces are passing. This device you will find to be very useful. It is recommended in Druitt's surgery.

When the bowels have acted, the protruded part ought to be well sluiced with cold water, and afterward with a solution of—

℞: Alum sulph.....ʒ j
Dec. quercus.....ʒ j
M. et. sig.

To be increased in strength if it can be borne; or an infusion of matico, Kremaria, or weak carbolic acid, should be applied with a sponge. The bowel must then be returned by gentle pressure, and the child should remain recumbent for some little time, lying upon its face, on a couch, with its neck turned so its face is made comfortable. If there be any intestinal irritation, small doses of—

℞: Hyd. C. creta.....grs. ij to grs. iij
Pulv. rhei.....grs. iij
M. et. sig.

Give this at bedtime. It may be necessary to give steel-wine two or three times in the day, after meals, for a tonic. When the child is very ill-nourished, cod-liver oil does much good. The diet should be nourishing and digestible; well-beaten eggs, flavored with nutmeg, or something palatable, should be given twice a day. Milk fresh from the dairy is better than that that has stood too long before using.

If mild measures do not succeed, Allingham, who has had a very wide experience in all diseases of the rectum, recommends the application of strong nitric acid as being the best remedy. "Chloroform is administered, and the protruded gut well dried. The acid must be applied all over it, care being taken not to touch the verge of the anus or the skin. The part is then oiled and returned, and the rectum stuffed thoroughly with wool. After this, a pad must be applied outside the anus, and kept firmly in position by adhesive plaster, the buttocks being by the same means brought close together. If this precaution be not adopted, when the child recovers from the chloroform, the straining being urgent, the whole plug will be forced out, and the bowels will again protrude. When the pad is properly applied, the straining ceases, and the child suffers little or no pain. I always order a mixture of aromatic confection, with a drop or two of tincture of opium, so as to confine the bowels for four days. It may be given every eight or ten hours, if necessary, to relieve the straining and keep the child quiet. At the end of four days, the strapping is removed, and a teaspoonful of castor-oil is given. When the bowels move, the plug comes away, and there is no descent of the rectum.

"I have had experience in this treatment in a great many cases,

and I have never known it to fail if properly carried out, and only on two occasions have I had to apply the acid more than once. The result is, also, not a temporary but a permanent benefit.

"Procidentia in the adult is very much more unmanageable, and is supposed in many instances to be quite incurable. Sometimes a procidentia occurs conjointly with internal hæmorrhoids. In this case, when the procidentia gut is returned, there still remains outside the anus a ring of hæmorrhoids, or loose and thickened membrane. I may say that when the procidentia is small, it will almost certainly be cured by ligature of the pile. This was clearly shown by Mr. Hey, of Leeds, years ago."

Treatment in Adults.—As a curative means, "thermo-cautery is employed. Three or four of the tissues are cauterized. The patient is given bismuth or opium to produce constipation, which is overcome on the eighth or ninth day by a light purgative."—Edward Montgomery, M. D.

Dupuytren produces cicatricial narrowing of the anus, by removing with curved scissors from two to six radiating folds to the right and left of the anus.

Duret removed from the posterior wall of the rectum a triangular piece of the mucous membrane, the base of which included a part of the sphincter.

Schwartz excises a large piece of the anterior wall of the rectum and the anus.

Mikuliez shortens the rectum in the following manner: The intestine is emptied by an injection, and opium is administered to limit peristalsis. The patient is placed in the dorsal position, and the field of operation is rendered antiseptic. At a point from two-fifths to four-fifths of an inch from the anus, the external cylinder is divided in its anterior half. The next step consists in incising, transversely, the posterior half of the external cylinder, layer by layer, from three-eighths to six-eighths of an inch from the margin of the anus. Sometimes, upon reaching the peritoneum a hernia of the small intestines will be perceived, and will need to be reduced. Should the sphincter prevent reduction, the muscle may be cut and the peritoneal fold united. The bowel is then incised, layer by layer, the vessels met with being tied, and the two edges united by the uninterrupted sutures carried through all the coats, threads being left long enough to serve to steady the rectum the remainder of the operation. The dissection and suturing of the posterior half are next performed, all the sutures are cut short, and the mass is powdered with iodoform and returned into the rectum.

An operative procedure called "rectopexy" was performed by Verneuil. It consists of three steps, as follows: An incision is made about an inch and a half long upon each side of the anus, extending obliquely from above downward and backward. The portion of the anal circumference included between the anterior extremities of the incisions corresponds to the portion to be contracted. They begin at

the point of junction of the skin and mucous membrane. From their posterior extremities start two other small incisions, which meet at the coccyx. The included flap is dissected from behind forward, the posterior fourth of the sphincter being removed at the same time, care being taken not to injure the rectal wall. The second step consists in the insertion of four sutures of silkworm gut, introduced transversely with a curved needle, into the posterior wall of the rectum, without injuring the mucous membrane. When the sutures are drawn toward the sacrum, it will be seen that the cavity of the rectum is made decidedly narrower, and that the posterior wall is fixed to a certain extent. To make this result permanent, a needle is introduced through the skin near the sacro-coccygeal articulation, about an inch from the median line, and is brought out in the ano-coccygeal wound. The corresponding end of the upper suture is then passed through the needle's eye, and is drawn out by withdrawing the needle, which is then introduced at a corresponding point on the opposite side, and the other end is secured. The other sutures are treated in the same way, being tightly drawn and tied one after the other. The third step consists in excision of the cutaneous flap which has been dissected, and is adherent by its base. A few sutures are inserted in the vicinity of, and a little higher than the anus. This operation affects only a limited portion of the rectum, either in length or in height.

Allingham, of St. Mark's Hospital, London, speaks very highly of Dr. Van Buren's (of New York) plan of treatment. He says: "I have operated by his method in twenty-six cases, with most satisfactory results; but I have also seen several patients in which the procidentia was situated high up in the bowels, and was only able to alleviate their sufferings by directing them to pass a bougie, preparatory to their bowels acting, which should be performed in the recumbent position."

Dr. Van Buren's method is as follows: "The patient is anæsthetized, and if the part be not quite down, it can readily be drawn fully out of the anus by the vusellum. I then, having the intestines held firmly out, with the iron cautery at a dull red heat, make four or more longitudinal stripes from the base to the apex of the protruded intestines, taking care not to make cauterization as deep toward the apex as at the base, because near the apex the peritoneum may be close beneath the intestine, while a deep burn near the base is not dangerous. I take care to avoid the large veins, which can be seen on the surface of the bowels. If the procidentia be very large, I make even six stripes. I then oil, and return the intestine within the anus. Having done this, I partially divide the sphincters on both sides of the anus, with a sawing motion of the hot iron, and then insert a small portion of oiled wool. From the day of operation I never let the patient out of bed for anything. The motions are all passed lying down; consequently the part never comes outside. If the wound has not thoroughly healed in a month, I continue the recumbent position for

two weeks more, by which time it very rarely happens that all is not healed. The patient can then rise and get about; but still, for some time, I enjoin that evacuation of the motion should be accomplished lying down. The reason for the success of the treatment is simple enough. When the burns are all healed, the bowels, by contraction of the longitudinal stripes, are drawn upward, and circumferential diminution also takes place. Should one operation not succeed, a repetition of the burning must be tried. With this method of treatment I have had great success, many persons being quite cured, while others have been greatly benefited, so as to be able to work by only wearing a pad of cotton wadding."

ULCERS AND STRICTURES OF THE RECTUM WITH AND WITHOUT ULCERATION.

Ulceration of the rectum extending above the internal sphincter, and frequently situated entirely above that muscle, is not a very uncommon disease. It inflicts great misery upon the patient, who dies of exhaustion unless extraordinary means are resorted to. In the early stages of the malady, careful, rational, prolonged treatment is often successful, and the patient is restored to health. Ulceration of the rectum can be mistaken only for malignant disease. But when the finger is well educated, only occasionally can there be any error committed in diagnosis. As the early manifestations are fairly amenable to treatment, it is of the utmost importance that the disease should be recognized early. Unfortunately, it is rarely so. The symptoms are obscure and insidious, the suffering at first but slight, and thus the patient deceives, not only herself, but her medical attendants, by the little heed that is usually given to the complaint.

Varieties of Ulcerations.—There are various causes of ulceration of the rectum proper, and each variety gives rise to a specific kind of ulceration. These, for practical purposes, may be divided into tubercular, dyesnteric, and syphilitic. The history in the majority of cases alone will indicate which kind of ulceration the patient is suffering from, and too much reliance should not be placed upon the feel or character of the ulcer.

Symptoms.—In the majority of these cases the earliest symptoms are morning diarrhea, and that of a peculiar character. The patient will tell you the instant that she gets out of bed that she has an urgent desire to go to stool. She does so, and the result is not satisfactory. What the patient passes is a little wind and a little loose motion, sometimes resembling coffee grounds, both in color and consistency. Occasionally the discharge is like the white of an unboiled egg, or a jelly-fish; more rarely there is matter. The patient in all probability has tenesmus, and does not feel relieved. There is some burning and uncomfortable sensation, but not actual pain. Before the patient is dressed, she again has to seek the closet. This time she has more

motion, often lumpy, and occasionally smeared with blood. It may happen that after breakfast, hot tea or coffee having been taken, the bowels will again act. After this she feels all right, and can go about her business for the rest of the day, only, perhaps, being occasionally reminded by a disagreeable sensation that she has something wrong with her bowels. Not always, but at times, the patient has morning diarrhea, attended with griping pain across the lower part of the abdomen, and great flatulent distension.

When a physician is called and consulted, the case, in all probability—and quite excusably—is considered one of diarrhea of a dysenteric character, and treated with some stomachic and opiate mixture which affords temporary relief. After this condition has lasted for some months, the length of this period of comparative quiescence being influenced by the seat of the ulceration and the rapidity of its extension, the patient begins to have more burning pain after an evacuation; there is also greater straining, and an increase in the quantity of discharge from the bowels. There is now not so much jelly-like matter, but more pus, more of the coffee-grounds discharge, and blood. The pain suffered is not very acute, but very wearying, described as like a dull toothache, and it is induced now by much standing about or walking. At this stage of the complaint, the diarrhea comes on in the evening as well as in the morning, and the patient's health begins to give way, only triflingly so, perhaps, but he is dyspeptic, loses his appetite, and has pain in the rectum during the night, which disturbs his rest. The patient also has wandering pains, and apparently anomalous pains in the back, hips, down the leg, and (if a male patient) sometimes in the penis. There are also in the latter stages of the disease, marking the existence of some slight contraction of the bowels, alternating attacks of diarrhea and constipation, and during the attacks of diarrhea the patient passes a very large quantity of fæces. These seizures are attended with severe colicky pains in the abdomen, with faintness, and not infrequently sickness.

Patients suffering from ulceration are very liable to attacks of a low form of peritonitis, attended with considerable abdominal pain, often intense for a short period. There are generally one or more spots that are tender on pressure. There is tympanitis, often vomiting, especially on first resuming the erect position in the morning, and generally the pain is brought on by standing or moving about. These attacks are sure to end in diarrhea.

Examination.—On examining these cases of ulceration of the rectum, various conditions may be noticed, according to the stage to which the disease has advanced. In the earlier period, you may often feel ulcers situated about one and a half inches from the anus, varying in shape, some an inch long by half an inch wide, surrounded by a raised and sometimes hard edge. There is acute pain caused on touching them, and they may be readily made to bleed.

With a speculum the ulcers can be seen distinctly. The base of

these ulcers is grayish or very red and inflamed looking, or sloughing, the surrounding mucous membrane being probably healthy. In the neighborhood of the ulcers may often be felt some lumps, which, when syphilitic, may be either gummata or enlarged rectal glands. This is the stage when the disease is often curable. Later in the progress of the malady, you will observe deep ulcers with great thickening of the mucous membrane, often roughening to a considerable extent, as though the mucous membrane had been stripped off. At this stage you generally notice, outside the anus, swollen and tender flaps of skin, shiny, and covered with an ichorous discharge. These flaps are commonly club-shape, and are met with also in malignant disease; but in the early development of the disease no ulceration is found near the anus, nor at the aperture. It is said that a large majority do not commence by any manifestation at the anus, such as growths or sores. Occasionally, a fissure may be the first lesion, and the ulceration extend from the wound made in the attempt to cure it. This is, however, said to be an exception to the rule. So definite is this external appearance in long-standing disease, that one glance is sufficient to enable an expert to predicate the existence of either cancer or severe ulceration. These external enlargements are the result of the ulceration going on in the bowels, and the irritation caused by almost constant discharge. The ulceration may be confined to a part of the circumference of the bowel, or it may extend all around, and for some distance up the rectum. It will also, probably, have traveled downward close to the anus, and then the pain is sure to be very severe, because the part is more sensitive and more exposed to external influences and accidents.

When the disease has reached this stage, stricture, and most probably fistula, will be present, and not infrequently perforation of the bladder into the vagina or into the peritoneal cavity may occur.

The state of the patient is now most lamentable; his or her aspect resembles that of a sufferer from malignant disease, and no remedy, short of colotomy, offers much chance of even temporarily prolonging life. You may relieve these patients, but can rarely do more. A cure can scarcely be expected. Ulceration will utterly destroy both the anal sphincters, so that the anus is but a deep, ragged hole. In the earlier stages of ulceration, from whatever cause save cancer, treatment carefully selected, judiciously varied, and persistently carried out, may do much good, and in favorable cases even effect a cure; but the patient must have faith in the surgeon, and be prepared to submit to a long-continued watching when much improved. If the sufferer runs about from one doctor to another, his fate is sealed, as he gives neither himself nor the surgeon a chance.

Palliative Treatment.—In all stages of ulcerations, the patient should rest in the recumbent position, and a fluid diet should be used. Milk should be the essential element in such a diet. Many patients can be cured with a very little medicine. Every third day touch the ulcers with slight caustic. Nitrate of silver, ten to twenty grains to

the ounce, is very good for this purpose. Use bismuth and a little opium to control straining and diarrhea, and rest on a sofa during the day. I have been successful in using a mild current of galvanism. Have a small electrode to fit the size of the ulcer, wrapped with absorbent cotton, dipped in ten per cent of cocaine; place the positive over the sacrum or in the vagina, and the negative in the base of the ulcer, using great care not to press too hard with the electrode, lest you do injury. Give about five milliamperes. Seance from a half to two minutes is sufficient to stimulate the base of the ulcer to heal; then you may touch the ulcer with a ten-per-cent solution of nitrate of silver. The day following this treatment, the patient may inject with a dropper a few drops of the following lotion:—

℞: Chian turpentine.. .....3ss to j
Linseed oil. ....℥iv
Misce.

Use night and morning, the days between the application of the nitrate silver solution. After each movement of the bowels, the rectum should be washed out with warm water. I have never had a case of simple ulceration of the rectum, not malignant, that I have failed to heal since I have used the galvanic current of electricity to aid the caustic solution, etc.

The edges of old chronic ulcers, I may add, that are hard and unyielding, you will find will soften up as the ulcer heals from its base, and this will allay contraction and alleviate pain. If the ulcer is one of the bleeding variety, the anode, or positive pole, should be made active to check the bleeding, and is to be applied in the same manner as above described.

A very good powder to be blown into the ulcer through a quill or glass tube, or an insufflator such as used for flea powder, is:—

℞: Hydrarg. chlor. mite.....3j
Bismuth sub-nit.....3ij
Misce.

Puff a little into the base of the ulcer once a day or every other day, as needed, to promote healing.

Allingham recommends the following as most efficacious:—

℞: Bismuth sub-nit.....3ij
Hydrarg. chlor. mite.....℈ij
Glycerine.....3ij
Morph. acetat .....grs.ij
Vaseline.....℥j
Misce.

This is a very sedative application, and sores seem to be benefited by it speedily.

Subacetate of lead, belladonna, and opium will be found to be excellent. All sorts of astringents may be employed to suit each indi-

vidual case: Rhatany, Friar's balsam, zinc, permanganate of potash, sulphate of copper, half to one grain to the ounce of water; touch the base of the ulcer daily, then wash out the rectum afterward, and inject a bit of oxide of zinc ointment, with an ointment introducer.

Fuming nitric acid, or strong carbolic or chromic acids, are favorite remedies with many surgeons, and are potent remedies, if carefully applied under certain conditions. They are said to often allay pain and start healing processes afresh, but they are "double-edged" weapons, and should be used with great discretion and with a distinct object in view.

℞: Cocaine.....grs xvii
Lanaline.....ʒss
Misce.

This will greatly allay pain and irritation in these cases.

When the ulceration is tubercular, all treatment is extremely unsatisfactory, but by attention to the above details patients may be greatly relieved.

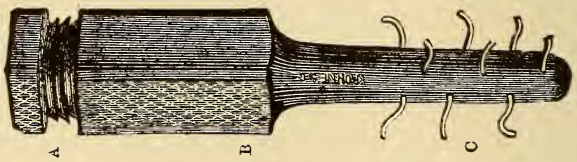


Fig. 26.—Improved American Ointment Introducer.

The screw A being removed, the box B is to be filled with the ointment. On introducing the instrument into the rectum, and turning the screw, the ointment passes out of the apertures, as shown at C.

The rectum should be washed with a little peroxide of hydrogen, then rinsed with warm water, and a little iodoform puffed into the base of the ulcer. At bedtime inject a half teacupful of flaxseed tea, with about ten grains of boracic acid, high up into the rectum, and retain it. The patient should occupy a warm, sunny room, well ventilated all the time, and must avoid drafts. Wear warm flannel next to the body. Good tonics and small doses of arsenic are useful in all consumptive cases.

Syphilitic ulcers require, in their early stages, a thorough course of mercury; but when the disease is of a tertiary variety, large doses of iodide of potassium and tonics, with changes in climate, afford the only hope of improvement.

STRICTURE OF THE RECTUM WITHOUT ULCERATION.

This condition is said to be somewhat uncommon. It is supposed that inflammation of the submucous tissue produces a deposition, and besides this, or resulting from this, there are spasms. I have seen strictures of the rectum so tight that I could not get the end of my

little finger into them, but when the patient was well under the influence of chloroform, I have been able to pass one or two fingers through easily. The inflammation may be induced by passage of very dry and hardened fæces, though this condition may obtain for years, as it often does in old people, without producing stricture. The most characteristic feature of stricture is the passage of numerous very small, broken pieces of fæces, it having no actual form, and looseness often alternating with this lumpy condition. The discharge in simple stricture is like the white of an egg or a jellyfish, and is passed when the bowels first act. There is no coffee-ground-looking discharge so constantly seen in ulceration, nor is there any morning diarrhea which we get in that complaint. There is very rarely any pain experienced in the bowel itself; the symptoms are more or less referred to parts, notably, if in a male, the penis, perineum, bottom of the back, thighs, beneath the buttocks, and occasionally the stomach. Fortunately, strictures of the lower bowels are generally in sight and within reach, but occasionally they are found high up in the sigmoid flexure, or still more distant from the anus.

Symptoms.—Without ulceration the symptoms are straining and difficulty in discharging the motion. It is stated in some works that the stools are long, thin, and pipe-like. Spasms of the sphincter, enlarged prostate gland, and tumors of the pelvis much more frequently give rise to flattened-shaped and thin and ribbon-shape motions, and are expelled with marked difficulty.

Allingham's Method for Examining Stricture.—Vulcanite balls of different sizes are used, mounted on pewter stems, with flattened handles. They are easily bent into any form. They will bend in the bowel, and by their use you may make certain of detecting a stricture; for when they pass, or are gently withdrawn, the ball is felt to come suddenly, and perhaps with some difficulty, through the constriction; its length can also be approximately measured.

Allingham's Method of Treatment.—If the stricture and ulceration exist, the complication must be treated as described in the preceding chapter. At the same time the stricture may be treated by the use of bougies; but to do any good, the greatest gentleness must be practised by the surgeon. Pain ought not to be caused, although considerable discomfort can not, in most cases, be avoided. Too large-sized bougies are unnecessary. Keep below the size that can be well borne, rather than at all above it. It is not safe for a patient to treat herself by the use of a bougie, as there are recorded cases where they have thrust the instrument through the rectum wall, causing peritonitis and death. In cases of stricture, when there are great spasms, with a small amount of organic disease, much good may be done by the use of bougies. Before passing the bougie, it is best to inject the bowel with some sedative, as opium and belladonna, and to use some stiff lubricant on the bougie, such as blue ointment. If the instrument can not be quickly passed, it is better not to persevere, as irritation will be set up and damage done.

Once set up spasms, and all your endeavors may be frustrated. The stricture must, as it were, be surprised. Any forcible dilatation in these cases is to be avoided. You may tear or split the stricture with Todd's dilator, but you are more likely to get ulceration than permanent benefit to the stricture. On the same principle I should not cut, even in the slightest degree, any constriction where no ulceration existed, save in cases which I will describe. If the stricture is high up, the use of Todd's dilator is dangerous. I have seen profuse hemorrhage follow its use; and the bowel might be torn, to the injury of the peritoneum, especially in women. In these cases I am also of the opinion that retaining a bougie or tube any length of time is not usually advantageous. You may produce ulceration, and if this be done, you will perhaps irretrievably damage your patient. Gentle dilatation, very gradually increasing the size of the instrument, is the only safe treatment. The conical bougie is a good form, as gentle pressure induces this to enter the stricture more easily; but you should never cause pain, and you may be sure that if blood or mucous passes after your manipulations, your patient will have little to thank you for.

In obstinate cases its daily use has, in my more recent experience, been followed by greater permanent good. Still, in this matter every case must be judged on its own merits, bearing in mind the axiom, "Never irritate."

Annular strictures are so resilient that even if dilated to their fullest extent, they soon return to their previous state of contraction. It is in these cases alone that it is considered advisable to operate by incision, which is recommended to be only superficial, and dilatation should be commenced on the day following the operation.

When the stricture is well dilated, the patient generally experiences the greatest amount of relief. There is no more straining at stool. Comfortable, good-sized motions are passed, and many anomolous symptoms vanish. One drawback is the rapidity with which all strictures are apt to return. The patient should not be long without having the bougie passed, and certainly, as soon as any of the old symptoms recur, at once obtain treatment. If this advice is acted upon, but little fear need be entertained of permanent dangerous relapse.

For bad ulcerations, stricture, and fistula an operation is required, of which I will not go into the details, as such cases belong to gynæcology.

Cancer of the rectum, which I will not discuss, is entirely surgical.

CONSTIPATION, OBSTIPATION, COSTIVENESS.

Definition.—Sluggish action of the bowels. Many able and interesting papers have been written upon the medical treatment of this common and troublesome complaint, for it often greatly affects the constitution of the patient, making her dull and nervous, deranging the digestive functions, and thus giving rise to very severe reflex symptoms. No doubt ill health may be the cause of constipation; but, on the other

hand, constipation may be the primary cause of ill health, for retained fæces poison the blood, and then the body is illy nourished; therefore it is certain that for the cure of constipation the system should be speedily relieved of the poisonous matter.

Etiology.—The intestinal contents are forced onward as the result of peristalsis. From twelve to twenty hours are necessary for their passage from the cæcum to the anus, although but four hours are required for their journey from the pylorus to the cæcum. When paristalsis is checked by atony of the muscular coat, from congenital weakness or acquired degeneration, by deficient nervous excitability, or by peculiarities of the contents, persistent constipation is the result. Congenital weakness may be the cause of the enormous enlargement of the colon which is at times seen in young children, and which persists, despite the inducing of free evacuation by means of appropriate treatment. Acquired degeneration of the muscle is of frequent occurrence in chronic catarrhal enteritis, in chronic peritonitis, and in amyloid disease of the intestines. Deficient nervous excitability may be due to organic disease of the brain or spinal cord, or to derangement, as in neurasthenia, hysteria, or to local affection of the intestines, as chronic passive congestion or intestinal catarrh, and in certain forms of insanity.

The excitability of the nervous apparatus of the intestines varies in individuals, and is weakened by sedentary habits and negligence. The intestinal contents become abnormal, and cease to produce the necessary excitation, both from an excess and from a diminution of vegetable constituents. A deficiency of liquids, whether due to a dry diet or to profuse sweating, as in excessive muscular work or fever, is of marked importance in the causation of constipation; but an abundance of milk in some persons produces this result. Muscular spasms in the lower part of the rectum, oftenest excited by a painful fissure in the anus, and sometimes by ulceration of the mucous membrane, a retroflexed uterus, or a displaced ovary, at times prove a cause of obstruction.

Symptoms.—The effects of habitual constipation vary extremely in persons of nervous temperament. Some complain of headache, dizziness, mental sluggishness, depression of spirits, wakefulness, loss of appetite, and a coated tongue.

The nervous symptoms are due to the absorption of the toxic products of decomposition in the intestines. Fæces and putrefactive bacteria are, however, the normal contents of the large intestines, in which the fæcal retention takes place, and there is no exact evidence that any undue absorption of putrefactive products occurs.

The tendency of prolonged constipation is to the accumulation of fæces, resulting in fæcal impaction. Increasing distension of the abdomen takes place, and distended coils of intestines can easily be felt, especially in thin people. The accumulated fæces can be felt in the rectum or through the vagina. The accumulation takes place in the sigmoid flexure, descending colon, and cæcum, and may be present in various parts of the intestines, which can also be felt through the

vaginal wall. The local effect of the fæcal tumors varies considerably. The impaction of the fæces in the rectum usually gives rise to frequent distress, from constant desire for evacuation, although only a small quantity of slimy matter escapes. In consequence of the pressure of the mass upon the wall of the rectum, there is passive congestion, indicated by piles and leucorrhœa, or pain when the nerves of the pelvic plexus are compressed. Impacted fæces elsewhere in the large intestines may prove uncomfortable from their weight and mobility, and may be mistaken for an abdominal neoplasm. It is said that ulceration of the cæcum rarely results from the presence of fæces in this part of the bowel, but painful tumors in the right iliac fossa may be due to the association of appendicitis with fæces in the cæcum. Retention of scabalæ in diverticula of the colon may be followed by an inflammation of the wall, extending to the peritoneum or into the meso-colon. Fæcal retention in the sigmoid flexure is said to be an important element in the production of twist of this part, by elongation of the loop, resulting from the long-continued traction, and partly because the weight of the loop facilitates its turning.

Diagnosis.—The diagnosis of chronic constipation is usually readily made by the history of the case, and from the effect of treatment.

One daily evacuation of the bowels is the custom of most healthy adults. Exceptional persons are found in whom one movement every three or four days is considered to be normal. It is also important to bear in mind that frequent movements of the bowels and abundant slimy discharges may be associated with and result from chronic constipation.

Treatment.—First remove the cause. Medical treatment is to be avoided if possible. The faradic current of electricity should be persistently used for some length of time. The person can be taught its use, and it is one of the most valuable aids to relieve constipation, when properly applied. (See article on electricity.)

Sedentary habits are responsible for constipation in many persons; also postponing going to morning stool will produce constipation. Exercise should be enjoined, open-air exercise, if possible, gymnastics along with the general exercise, which should be encouraged enough to get the person in good muscular condition, and should be associated with movements which are especially adapted to strengthen the abdominal circulation. Many of the so-called "Swedish movements" are valuable for this purpose. Massage is especially useful in this condition. Some writers recommend the patient lying on the back, and rolling around and around on the abdomen daily, for ten to twenty minutes, a ball of heavy wood or iron, using care not to get exposed, and to avoid a too rigorous use of this method. The habit of defecation at a certain time every morning should be practised. The morning hour, for most persons, is the most convenient from a medical standpoint. The special time of day does not matter, though the daily regularity is essential.

A glass of cold water on rising in the morning is considered to be a very useful aperient for many persons, instead of the use of fluids in small amounts, which is frequently the case. The habit of free

water-drinking should be formed, with the view that the intestinal, as well as the other secretions, will be rendered more abundant. The patient should not drink ice-cold water, as this is very deleterious, especially when there is chronic gastric catarrh or atony of the digestive organs. Many delicate women can drink hot water in large quantities; a pint or more before meals is found to be very useful for this purpose. At bedtime, as well as upon rising in the morning, the person troubled with habitual constipation should drink from eight to sixteen ounces of water. He will find it often distinctly effective in promoting morning evacuations.

Each individual must have food adapted to the case. The law is, "The greater amount of residue incapable of digestion in the food, the greater is its laxative influence." Laxative articles of food are fresh or dried fruits, all green vegetables, and grains ground entire, without separating the hull from the starchy interior, such as cracked oats, rolled oats, etc.; these stand first; but with some, however, cracked or rolled wheat is a superior laxative, as it is less digestible than rolled oats. Graham bread made of unbolted flour is much superior to white bread; rice is not considered much of a laxative.

Sugars, and substances containing them, are laxative, although they are digested. Oils, especially vegetable oils, such as that of olives, are mostly laxative, and, when they can be digested, are a valuable addition to diet. Trial in each individual case affords the only test. Two tablespoonfuls of sweet-oil given after each meal are very beneficial in obstinate cases. Some writers advise a tablespoonful of whisky to be taken with the oil. Half a cup of pure black coffee, taken with olive-oil, after meals, is very efficacious in most cases.

The difficulty in food management of constipation is that, in most cases, the condition is so often associated with feeble digestion, and that to digest food containing a large amount of indigestible matter is beyond the power of the patient. The diet must be carefully regulated to suit each case. I have found that New Orleans molasses, two parts, and common brown sugar, one part, made into candy, with a little fresh butter, and eaten before going to bed, is a very good laxative for children, and for adults also, if taken in considerable quantity.

Medicines sometimes become a necessary evil. Avoid their employment as much as possible. Second, use them, if at all, in small quantities, regularly, day by day, not allowing the patient to become constipated, and then giving a purgative dose, but seeing that a passage from the bowels is obtained each day. Third, change the drug or combination of drugs at short intervals, so as to prevent the intestinal canal from becoming accustomed to any one remedy. Enemata, glycerine one tablespoonful in a pint of warm water, injected high up into the bowel, will move the bowels; also suppositories of glycerine or gluten will act upon the rectum and lower colon, and produce fæcal discharges. They are less effective in emptying the upper portion of the bowels or colon. They are used only as a substitute for laxatives, or for the purpose of obtaining a stool when the laxatives have failed to act.

We have saline and vegetable laxatives. Among the saline laxatives must be placed the various mineral waters, too numerous to mention, which are very useful, as well as fashionable. The natural mineral waters are considered to be a little better than the artificial preparations. On the other hand, a single saline, such as Rochelle, Epsom, or Glauber's salt, or citrate magnesia, may be administered by itself. The saline should always be given immediately upon getting out of bed in the morning, and should be taken in a half pint of water, hot or cold, according to the condition of the patient.

Vegetable Laxatives.—Among the most popular may be mentioned extract of cascara sagrada, or the fluid form, or an elixir, given on going to bed; or it may be administered night and morning. Dose to suit the age of the person and the severity or chronicity of the case. Compound licorice powder, a heaping teaspoonful night and morning, works well in many cases.

The following pill:—

℞: Aloin..... gr. $\frac{1}{6}$
Strychnine..... gr. $\frac{1}{60}$
Ext. belladonna..... gr. $\frac{1}{10}$
Misce.

is a most efficient pill given after meals, three times a day, or one night and morning may suffice.

Extract of colocynth, preferably in combination with extract of belladonna, is very useful. Preparations of senna, of resina, of podophyllin, or of rhubarb, are excellent changes, which ought to be often made in obstinate and old chronic cases, where medicines have to be resorted to. Eserine is rather a new remedy, or it has not been much used until recently. It is said to work extraordinarily well in chronic constipation. It acts simply as a stimulant of the muscular coat of the bowels, and is especially valuable in elderly and other people, in whom the intestinal muscular fibers are failing in power. By its use the amount of laxative required may often be very gradually reduced. The ordinary dose is from $\frac{1}{40}$ to $\frac{1}{30}$ of a grain, though $\frac{1}{20}$ has been administered with impunity.

Liquid preparations have the advantage over pills, as the dose can be readily decreased or graded to suit the case. The following is a simple formula:—

℞: Pulveris sennæ..... ℥ij
Pulvis yingiberis..... ℥j
Pulveris aloes..... ℥ij
Spts. frumenti..... ℥j
Misce.

Agitate frequently, and, after three days, take at bedtime from thirty to sixty drops of the clear liquid. Increase or decrease the dose according to the case. This is a very satisfactory laxative, and should not be very expensive. Generally it is most desirable to give vegetable laxatives at night, as it requires some hours for their action. Vegetable

laxatives, such as cascara sagrada, the fluid extract, from a half teaspoonful to a teaspoonful night and morning, or after each meal, act well when administered in this way. It is said it is better to give eserine in small doses after each meal than it is to give one full dose at bedtime.

Sometimes there is much difficulty encountered in the removal of impacted fæces. It is essential in all procedures to avoid, as far as possible, the production of irritation; therefore great gentleness should be used, and irritant, drastic cathartics should be avoided. It is better to give small doses of calomel, from one-fourth to one-half grain, given alternately with Epsom or Glauber's salts, every two hours, until the bowels move. Never give over two grains of calomel, with a grain or two of soda with each dose of calomel. Do not permit the patient to eat anything sour while the calomel is being administered, and thoroughly move off all the impacted fæces before any acid drinks are allowed. When the patient feels that the bowels want to move, an injection of flaxseed tea, with olive-oil, three tablespoonfuls of the oil in a pint of flaxseed tea, should be administered, with the patient in the knee-and-chest position or lying on the left side; and it should be retained as long as half an hour if possible; then, if this does not move the bowels, inject warm, thin corn-meal gruel enough to move them freely. As soon as the bowels are thoroughly cleansed, use the following pill to restore the power of the colon and rectum, thus inducing a regular action of the bowels:—

℞: Ferri sulphas exsicc.....grs.xv
Quinæ sulphas.....grs.xxxv
Ext. nuces vom.....grs.x
Ext. aloes aq.....grs.xxxvi
Ext. tarax.....q. s.
M. et fiat pil in capsules.....no. xxxvi

Take one pill three times a day after meals. Faradization is advantageous in these cases. An old-fashioned "black draught" of senna and Epsom salts is more generally useful. One-sixth of a drop of croton-oil is sometimes combined with a vegetable drug in obstinate cases.

In some cases the sphincter may have to be dilated, under an anæsthetic, so as to reach the interior of the rectum without any difficulty, and break up the mass with your finger, or a scoop, or the handle of an old-fashioned spoon. The spasms of the sphincter being thus overcome, a great deal can be done in emptying the rectum. A fountain syringe filled with hot soap-water will be excellent to wash out the rectum. Lastly, inject flaxseed tea and linseed oil, about a tablespoonful of the latter to a teacupful of the former. This, if retained, will aid the bowel to evacuate after the patient recovers from the anæsthesia, or it will soothe the rectum and add to the comfort of the patient. Oil and fresh ox-gall may be administered by the rectum, and the patient will often get rid of enormous quantities of fæces from their use.

CHAPTER XII.

DISEASES OF THE FEMALE BREASTS.

Sore nipples are sources of great distress, and too often the precursors of mammary abscess. They are thought doubtless to be caused by some apthous condition of the child's mouth; but they as frequently result from some unusual sensibility of the skin of the part, and at times from want of care. In first pregnancy mothers should always harden their nipples by the daily use of some spirit lotion or cologne and water; and where they are not sufficiently prominent, a breast-glass or gutta-percha shield should be worn, as these means tend to prevent this troublesome affection.

Treatment.—When sore nipples occur at the time of suckling, the rubber shield may be worn, great care being observed to dry the nipple after use. Wash the nipple after use in warm borax water, and never leave it in the child's mouth after nursing the child. The application of glycerine and tannic acid may be applied to the nipple and the breast near the nipple between the times of suckling the child. A solution of nitrate of silver, five grains to the ounce of water, applied after nursing the child, night and morning, is very useful in healing the cracked or fissured nipple. Burnt or dried alum powdered over the raw surface of the nipple is also serviceable. The mother must remember to wash the breast thoroughly before suckling or nursing the child. Castor-oil is a very soothing application, to be applied twice a day.

ENGORGEMENT OF THE BREASTS.

This takes place when from any cause a woman is unable to give suck, either from defective disease of the nipple or from the death of the child. Under these circumstances the glands are liable to become tense and distended, and if left unrelieved for twenty-four or thirty-six hours, they will probably inflame. The gland can be relieved by the application of the child; or, if the infant can not draw the breast, a very carefully-applied breast-pump may relieve the engorgement, and no harm follow. Many women have been relieved by a young puppy drawing the breasts. Another ancient (so to speak) method is a good plan; that is, for the mother to draw out the nipple by means of the old-fashioned feeding-bottle before giving it to the infant, the mother's nipple being put in the central opening, and her mouth drawing the artificial one. Another method is the application to the nipple of the mouth of a wide-necked, empty bottle, that has been heated by hot water, the nipple, as the bottle cools, being pressed into the bottle

and rendered prominent in a painless way. Immediately put the infant to the breast.

After the engorgement of the breasts has been relieved, pressure should be employed, by means of strapping the breasts. This strapping is done by means of a woolen bandage, or, better still, a surgeon's plaster, applied over the glands, which have been previously smeared with the extract of belladonna and glycerine in equal parts. A saline or other purge, as flour of sulphur, is of much value, with some tonic medicine, as quinine, one or two grains two or three times a day. Two or three drams of the sulphate of magnesia is a good saline laxative in these conditions.

In lobulated engorgement of the breasts, gentle rubbing, or friction with camphorated oil, is of great value. Warm, moist applications are very useful. Keep two or three thicknesses of flannel applied over the breasts until well.

INFLAMMATION OF THE BREASTS.

Inflammation may appear as either subcutaneous more or less extensive periglandular abscess, a local phlegmonous lobular inflammation, or a diffuse abscess throughout the whole gland. It may primarily involve the connective tissue which extends between the lobules, as well as the true secreting structure of the glands. It may likewise occur behind the gland. It may be acute or chronic in its nature. It may run its course without any breaking up of its tissue or suppuration, or be attended with most destructive local results, the extent of destructive tendency depending upon the severity of the inflammation and the amount of constitutional power of the disease. As a rule, suppuration usually takes place.

Creighton says: "When the mamma, in its state of full expansion and perfect functional activity, becomes the subject of interference, the result is very commonly a diffuse or nodular inflammation and the formation of an abscess. A sudden stoppage of the milk as soon as lactation has been established is apt to produce inflammation, and the same result, or a degree of it, sometimes attends the weaning of a child after a long course of suckling. The disturbing cause, whatever it may be, acts upon the mamma when its function is at its greatest intensity, and the characteristic effect is inflammation and abscess."

In a general way, inflammation attacks the breast glands when in a state of activity, and it is exceptional for the passive organ to be the subject of this process.

Kochler, Bunom, Bryant, and Winckel consider the first two weeks as the most common time for mastitis to appear. Cessation of lactation seems to increase the frequency of inflammation; but it is to be remembered that this cessation may be the result rather than the cause of inflammation. Ballard states that abscess in the early months is due to the sucking of the child before the gland is filled in the mother's

breast, when there is not sufficient power to secrete milk or to resist the inflammatory process when once originated. The affection is more common in young primiparæ, and the right breast is more frequently affected than the left, in ratio of five to three, according to Mr. Bryant's observation. In some cases the rapidity of an abscess is very marked, one forming within a few days, while in others it is much longer, perhaps two months. "Chronic abscesses have often been mistaken for new growths, and amputation of the gland performed under this false diagnosis.

"Abscesses occur in the breasts from injury and from cold. Abscesses occur in the infant's breasts; and it is too commonly the consequence of an ignorant nurse applying pressure to the glands in which milk is found, or friction to the glands to rub away the milk. The milk appears to be more abundant in the male infant than in the female."—Bryant.

They are also met with in the male subject from other causes.

Chronic mammitis in the boy or girl is said to be by no means a rare affection, the undeveloped gland becoming indurated and painful. Such cases rarely suppurate.

Treatment.—The activity of the treatment of the affection we are now considering must be regulated by the acuteness or severity of the inflammatory process, and the nature of the constitutional and local symptoms to which it may give rise. In all cases of mastitis the constitutional powers are generally feeble, and the disease is of a destructive nature; hence nothing like lowering measures should be adopted; but, on the contrary, soothing local applications and constitutional tonics with sedatives are absolutely demanded.

In cases occurring during lactation, no other principle of treatment than those we have mentioned should be entertained. Under such conditions soothing fomentations should be applied to the breasts, either of warm water or some medicated solution, such as a decoction of poppies. What is better is a light linseed poultice, with tincture of opium sprinkled over the poultice, and placed over the breast, and a piece of oil-silk over the poultice, or a warm flannel, thus keeping up the regular heat, by changing the poultice frequently; or lay a hot-water bag, filled only partly with hot water, over the flaxseed poultice. In the case of young, robust women, where suckling is impossible, saline laxatives should be given in large doses every four hours, until the bowels are thoroughly cleared out. Often it is necessary to give a half grain of calomel every hour, until three doses are administered; then give the saline laxative,—Epsom salts, a tablespoonful in about six or eight hours after the last dose of calomel has been given. If this does not move the bowels freely, repeat the dose in four hours after the last one was given.

Rest in bed should be insisted upon, as it affords comfort, and, when it can be carried out, is of great practical advantage; but if the patient can not rest in the recumbent position, the whole breast must be sup-

ported by a band of flannel or linen sling. During this time tonics, such as can be borne, may be indicated, and should be freely given. Quinine ranks first as a rule. It may be given in one or two-grain doses, two or three times a day. A sedative at night is also very generally required. Dover's powders, in ten-grain doses, are the best form. After the first purgation no more should be given, except mild saline laxatives, such as citrate of magnesia, or a dose of Rochelle salts occasionally.

OPENING A MAMMARY ABSCESS.

There is a great difference of opinion among surgeons about the propriety of opening a mammary abscess. Some advocate an early opening, and others leave it to nature. The practise some others adopt is to leave the parts alone until pointing has taken place, and then puncture, making an incision in a line radiating from the nipple. Warm fomentations at first, then applications of linseed meal, are the best in all stages of the disease. They are very grateful to the patient, and should be freely used. When the abscess has discharged, the poultice may be laid aside and some antiseptic application employed, such as carbolized vaseline, as constant poulticing soddens the integument and retards the process of convalescence.

TREATMENT OF CHRONIC ABSCESS.

The existence of a chronic abscess having been made out, the treatment becomes an important question. When the abscess is small, causing little or no annoyance, some surgeons recommend letting it alone, and, under the influence of tonics and local pressure, by means of strapping the breasts with surgeon's plaster, the fluid may be absorbed. In the majority of cases more active treatments are necessary, and of these the evacuation of the pus is the chief point. The best method appears to be a free opening at the first operation, the surgeon subsequently inserting a strip of oiled lint into the cavity of the abscess for a few hours, to prevent the wound from closing.

SUB-MAMMARY ABSCESS.

Abscesses occasionally form behind the breast gland, over the pectoral muscle; and when they do the gland or breast is pushed forward in a way that is characteristic. The abscess, as a rule, points below the breast. Such abscesses should be opened in the most dependent position as soon as any indication of fluctuation can be made out. This disease is very slow in its progress.

CHRONIC INDURATION OF THE GLAND.

This affection is chiefly found in unmarried women, between the ages of thirty-eight and forty, though it occurs in the married, and then, as a rule, in the sterile. The gland is morbidly excited. It is

usually associated with some catamenial irregularity or some general disturbance, more particularly of the nervous system.

Symptoms.—The affection is known by excessive sensibility of the indurated gland on manipulation, by the nervous excitement the examination causes, by the total absence of any local indication of a tumor when the fingers are placed flat upon the part, and by the induration of the gland, or lobe of the gland, when the organ is raised from the pectoral muscle and pinched.

Treatment.—The treatment consists in correcting what is wrong in the general constitution of the patient, by the means of iron, tonics, and alteratives. Gude's pepto-mangan of iron, or Fellow's syrup-hypophosphites and compound syrup of sarsaparilla, with a little iodide of potash added to it, may be taken three times a day. A belladonna plaster affords relief with or without pressure. With the anode of the galvanic current applied to each nodule or indurated lobe of the breast, and the cathode or negative pole applied over the ovary on the corresponding side, give from fifty to eighty milliamperes, for at least ten to fifteen minutes where there is only one enlarged gland; but if multiple, give from seven to ten minutes over each enlargement. Treat every other day, until the indurations get thoroughly softened up, when they gradually disappear.

The writer has had many such cases, and has always found that the galvanic current yielded comfort to the patient and a retrogression of the growth, in many cases has cured, and in all cases greatly benefited. Large breasts should be suspended, and all should be covered with cotton wool, to prevent risk of injury or taking cold. I have found young girls with irritable breasts, similar to those just described. In every instance the young girl was troubled with some kind of pelvic trouble, especially lateroversion of the uterus, with considerable thickening of the broad ligament; and in eight cases there was flexion of the neck of the uterus. In these cases I placed the cathode in the cervix as far as possible, and the anode over the breast, giving from ten to fifteen milliamperes; seance seven minutes. I first treated the patient over the ovarian region, by placing the anode over the lumbar region corresponding to the ovary to be treated, and the cathode over the ovary, giving from fifty to eighty milliamperes; seance not less than ten minutes. Next place the positive flat electrode over the indurated breast, and the negative either over the ovary or over the fundus of the uterus externally, for at least fifteen minutes; then, last move, place the negative pole of aluminum wire (insulated with rubber tubing nearly to the end, which is wrapped with a bit of absorbent cotton dipped in boracic solution) in the cervix, the flat electrode remaining over the breast, giving twenty to thirty milliamperes; seance, ten minutes. Give three treatments a week till relieved.

Plate d.—Hypertrophy of the Breasts.

FUNCTIONAL DISTURBANCES AT THE TIME OF THE CHANGE IN WOMEN.

"The circumstances of the functional disturbances are never exactly the same in any two cases. When a tumor forms in a breast within the period when the function may be awakened to its full and healthy vigor, that is, during the time of its structural and functional maturity, a resolution of the disease or the dispersion of the disease product may be looked for; but when it appears at or near the change, or climacteric period of years, when the gland is suffering an effacement of its secreting mechanism, and a withdrawal of its secretory force, no such result can be expected, and it is at this period that the greater number of intractable tumors occur."

"It is the climacteric effacement of the breast that gives a peculiar character to the disease in women, and there are well-marked structural differences in the tumors according as they appear before or after that period. Those that develop after the change of life, or climacteric years, are perhaps the most common, and they have been the real source of ambiguity in the pathology of the organ."

Dr. Creighton's investigation shows that the adenomata, sarcoma, myxoma, and carcinomata have their types in a series of changes, progressive in form, which the gland undergoes in its physiological evolution. The feebler the intensity of the function, the more cancerous the disease; the higher or more advanced the evolution from the resting state, the more benign the tumor.

HYPERTROPHY OF THE BREASTS.

This means an excessive growth.

Treatment.—The galvanic current is the proper treatment. Place the anode, flat electrode, over the breast, and the cathode over the spine or over the ovary. This will, if persevered in, check the growth. Keep the breasts suspended. All malignant growths should be operated upon, which is the only hope for relief.

CHAPTER XIII.

DIAGNOSIS OF CHILDREN'S DISEASES.

(Quoted largely from J. Finlayson, M. D.)

Diagnosis.—We usually begin by asking our adult patients how they feel, or where the pain is, if any be present. But our little patients may be too young to speak, or, if they do speak, the pains and discomfort may be referred to in a misleading manner; thus, it is common for a child with a pain originating in the chest to refer it to the stomach or the belly, and this not merely in words, but actually by direct signs. All the information we are in the habit of getting from the child's descriptions of his or her discomforts may thus utterly fail us. The distress may be as great or even greater than that of a grown person; but the "infant crying in the night," however definite, obscure, complex, or varied the nature of its misery may be, has "no language but a cry."

The methods for examining any sick person must be determined by the actual condition at the time, whatever plan may be in the mind of the physician. In the case of a sick child this is preeminently true. Urgent symptoms, like fits of any kind, or obvious features, like the appearance of an eruption, demand, of course, direct attention, without much preliminary inquiry. In ordinary cases it is well, as a rule, to hear from those in immediate charge of the child a full and connected account of the illness and its supposed cause, taking special notes of the exact dates on which the various events occurred, as this precision as to time often leads the narrator to correct, or modify, or expand the original statement. This preliminary statement is best obtained in the sick-room. The physician can then sit down without attracting the child's attention to the visit's having any direct reference to her; or the child may, at times, go to sleep during the narrative, and so afford a chance for seeing the effect of this state. Unless the child is very young, it is often best to get all this account in another room, out of its hearing; but, in any case, it is important that the examination should not be begun until the physician has a pretty clear view of what points may come up for investigation.

It is usually desirable to ascertain by definite and categorical questions whether the illness, as now existing, appeared to come on in the midst of perfect health, and if not, to ascertain with precision up to what time the child might be regarded as perfectly healthy. Unless this is put to the mother as a definite question, much confusion is liable to creep into the narrative. In very young children it is usually best to hear the whole medical history of the infant, with dates of weaning, teething, walking, etc., connecting the past history of the child with

his or her present illness. Any previous illness of the child should also be fully considered, as this often has a direct bearing on the case, even when the previous illness may seem of an accidental character, such as measles or whooping-cough; and this is all the more important when the illness investigated is chronic, and perhaps of an obscure or an indefinite character. To obtain a connected account of the child's illness is a matter of no small difficulty. The greatest forbearance and patience must be shown to women worn out in watching the young. Let them tell their story in their own way, and supplementary information can be gained by questioning. When a woman of good sense in attendance on a child alleges that it is ill, or that it is worse, the chances are that she is right, even though the proofs she may adduce may seem trivial or erroneous. Some women exaggerate in their interpretation and theoretical ideas, and so are apt to be wrong as to the nerves, etc., while others have the power of arguing clearly enough according to their knowledge of the case. All their statements should be weighed seriously as to the actual facts of the illness, and especially as to the general condition.

For the personal examination of the child there should be the greatest flexibility of plan, and a ready promptness in taking advantage of every chance which may arise, and in deciding at once which points are of the greatest immediate importance in the case. Thus, if the child is asleep, the pulse may be taken, respiration counted, the general character of the breathing observed, and the color of the face noticed. If the case seems to be one of abdominal disease, this sleeping state affords an opportunity for examining the belly, slipping the warm hand under the clothes of the sleeping child, and ascertaining the condition of the walls and of the internal organs, before crying, or fright, or pain may render the parts so tense as to baffle the observer. At times, by sitting down and taking the temperature in the axilla, holding the arm to the side, or getting the mother or nurse to do so, we may allow time for the agitation and fright at the sight of a stranger to subside.

It is often the case, however, that the greatest patience and tact seem alike thrown away, and the examination must remain very incomplete, or perhaps special parts of it, if of extreme importance, may have to be carried through by main force. Usually this depends less on the nature of the illness than on the habitually bad moral training the child has received from the parents; or it may be because the medical examination or treatment in this or in some previous illness has been of a harsh nature. The examination of the throat may have to be done by main force, and for this reason it is usually left to the last. Some young children will give every facility, and, by getting them to open their mouth widely, and draw a deep breath, we can see the fauces well enough; or we may require to aid the view by a gentle depression of the tongue with the tip of the finger or the end of a spoon. When such methods are not available, or fail to suffice, the best way is to make

preparation for securing proper light from windows or lamps or candles, and have good assistance for holding the child firmly during the examination, and for controlling the arms, which are often best kept out of the way by a blanket or a sheet held tightly around the front of the chest so as to include them. When all is ready, the mouth may have to be opened by main force, and even the nostrils held in separating the lips and teeth, and then with the handle of a spoon, spatula, or a tongue-depressor slipped quickly between the teeth and a little more than midway of the tongue, press the tongue down gently, and in the meantime let go of the nose, so the child can breathe easily, while the tongue is held down and the head turned so that both sides of the fauces can be seen in a good light. We are often aided by the gasping breathing of the child, or even by the efforts at vomiting. If proper arrangements for the examination have not been made before beginning, you may have it all to do over again.

Young children are usually examined best on their mother's knee; if in bed, they can be lifted out with one of their warm blankets around them; this change often helps to pacify them if fretful. The child must be kept covered with a soft shawl or blanket, warmed to prevent the child from getting cold while being examined. Small portions of the body are exposed at the time of the examination; then the shawl may be tucked around the loins while the back of the chest is being examined, or the shoulders, or the abdomen, as the case may be. If in a warm room a small portion of the body is exposed at a time, injurious results seldom follow. But if a large surface is exposed at once, it is quite a different matter, and, with the lower part of the back uncovered, the child is apt to take cold. If the child should be moist from sweating, or from poultices, the body should be dried with a warm, soft towel before exposing it for examination.

With some tact on the part of the nurse, when the child is sitting on her knee, its back may often be pretty well examined before the child realizes that anything except rearranging the clothes is being attempted, for the observer keeps literally, as well as figuratively, in the background, and some one may perhaps divert the child's attention in front by showing some bright object, as a lighted taper, trying, of course, to avoid, as far as possible, any distracting sounds in carrying out this diversion. In very young children, and even in some others, the back of the chest can often be examined by laying the child on its abdomen on the nurse's knees, and then uncovering the back. The child is often pacified, for a time, by this change of position, to which, of course, he is accustomed during the process of dressing and renewing the napkins. A similar benefit is often obtained by getting the nurse to hold the young child close to her breast, with the face of the infant toward either shoulder as if looking over it; and when the child's vision is thus directed away from the physician, the back may be in part uncovered for the purpose of examination. When the child is laid flat, the front of the chest may be examined by percussion-sound, or by the "series of strokes"

obtained in varying stages of inspiration and expiration, as the breathing is often so rapid that no other basis of comparison can be obtained. Auscultation of the front of the chest is usually best accomplished by means of a stethoscope, although the direct method can often be practised with advantage in this situation; and sometimes we are glad to try both methods if we fail at first.

The examination of the abdomen may often be taken with advantage before proceeding to the front of the chest. The relative importance of the two parts of the examination, as judged from the history of the illness, must guide us. If the child is lying quietly, we may be able to palpate the abdomen and determine the position of the organ, or the presence of glandular or other swellings, before attempting the examination of the chest; for this, of course, however carefully performed, may lead to a fit of crying.

The exploration of the abdomen is often most important, but not seldom the difficulties are extreme. No chance should be missed of examining it during a quiet period, perhaps while the child is asleep, perhaps before risking an upset from the examination of the chest. On the other hand, we may with equal propriety postpone the examination of the abdomen to the last if the child is cross, in hope of a better chance. Too often in young children we are confronted with the difficulty of extreme tension of the abdominal walls, with resistance and screaming and kicking; and in our attempts to make examination, palpation and percussion are equally useless. Sometimes, by keeping the hand lightly applied under the clothes until the child is settled, we may be able, without arousing his fears, to feel the state of matters as regards laxity, tenderness, or tumors.

In palpation we must see that the hand is warm, and that it is applied, in the first instance, gently and lightly, carefully avoiding any sudden jerks with the fingers, but feel with the whole hand, so as to avoid exciting the muscles to resistance. The presence or absence of tension of the walls is important. We often find tense inflammatory affection of the bowels and of the peritoneum, even apart from effusions; and if we can press down a lax abdominal wall without eliciting signs of pain, we may almost presume that there is no peritonitis. The mere inability to do this counts for little, unless circumstances favor the examination, as the least fright may render the abdominal muscles extremely tense, and pressure then readily causes pain and further resistance.

The next point is to determine the position of the organs and presence of any solid tumor. The liver can easily be felt, but it may, erroneously, be supposed to be enlarged, when but little changed in size. It must be remembered that the liver is relatively large in young children, and that it is also relatively prominent in them below the ribs; moreover, in rickets and other distortions of the chest, the liver is displaced so as to simulate a great enlargement. Indeed, the whole belly is often very prominent and distended in rickets. In rickety children

the spleen may also be readily found at times, partly from enlargement and partly from displacement. The spleen may be found enlarged in scrofulous children, with, it may be, albuminuria or other signs of amyloid disease. Occasionally the spleen is enlarged from ague, which must be inquired for. Concurrent disease of the liver may suggest the cause of splenic enlargement. Emboli are said to increase the size of a child's spleen.

Any pain or tenderness felt during the manipulations of the abdominal region, etc., should be noted. It is said there is not, as a rule, any tenderness on pressure in a large number of cases of tubercular peritonitis in children.

The prominent belly contrasting strongly with the wasted state of the chest and of the thighs, is a familiar appearance in tubercular disease of the abdominal organs, even in cases where there may be little or no fluid present.

Often great importance is to be attached to finding little tumors or lumps in the abdomen in cases of suspected tubercular peritonitis and tubes mesenterica. The uniform distention of the abdomen from fluid in the peritoneum often contrasts with more localized swellings from tumors there. The discrimination must be made by percussion and palpation, as in the case of adults. Fluid in the abdomen is often due to tubercular disease, although it may be due to dropsy from disease of the heart and the kidneys, but in such cases we have more or less dropsy elsewhere. A suddenly-developed dropsy localized in the abdomen may depend, as in the adult, on disease of the liver, perhaps, it is said, due to thrombosis of the portal veins. In such cases we look for an enlarged spleen, and we inquire for hæmorrhages from the stomach or the bowels. We also examine for jaundice or other signs of hepatic disorder. In bad peritoneal dropsy, from any cause, we may see hernial protrusions with fluid in them communicating with general abdominal effusions.

The chest is, of course, best surveyed when both chest and abdomen are completely uncovered; but the actual state of the child must determine whether it is wise to have it so. "The appearance of marked wasting, with great distinction of the ribs; the existence of any of the forms of 'pigeon-breast,' and prominence of the sternum, and an accentuated transverse groove above the liver; the presence of the so-called 'beading of the ribs,' consisting in visible and palpable swellings at the end of the ribs where they join the cartilages; various bad conformations of the chest, whether with depressions of the lower end of the sternum or with unilateral distortions interfering with the symmetry of the chest; bulging forward of the sternum, with a tendency to the circular form of the chest, indicative of emphysema in older children, as in adults—all these various structural peculiarities can often be sufficiently appreciated at a glance."

The awful dyspnœa in croupy attacks, with powerful action of the muscles of the neck, and sudden elevation of the upper part of the

sternum and ribs, almost in a mass, coupled with recesses of the ribs in the lateral region, and sucking in of the lower part of the flexible sternum, tells at once of the urgent need for air experienced by the child, and of the mechanical interference with its entry into the lungs. An excited action of the accessory muscles of respiration, with panting and heaving of the chest, but without the recession movement just described, characterizes attacks of spasmodic action in the child as in the adult; for, although not very common under the age of twelve or fifteen years, genuine spasmodic asthma in children is not so very infrequent as it is often supposed. Marked unilateral respiration, with one side heaving rapidly and the other motionless, is very suggestive of a large pleuritic effusion, and this is rendered almost certain if we detect, on getting a fair view of the chest, that the motionless side is larger and fuller than the other, with obliteration of the intercostal spaces. Some rearrangement of the position of the child may be required to ascertain this, as the decubitus is invariably on the affected side. Marked unilateral retraction and immobility at once suggest in a child the results of an old pleurisy or an empyema, although, of course, it may depend on long-standing pulmonary excavation or on the contraction of a fibroid phthisis. Moderate flattening and contraction under the clavicle, or impaired movements there; fulness over the pericardial area from effusion; general bulging of the tissues of the chest and neck, with crackling on touching it, due to subcutaneous emphysema,—all of these require detailed examination, and can not be recognized the moment the chest is seen, as in many of the conditions already mentioned.

STATE OF GENERAL DEVELOPMENT; WEIGHT, DENTITION, WALKING.

The child's clothes must be removed to afford an opportunity of judging of the general development. The large head, prominent belly, and distorted chest may at once fix our minds on a case of rickets, even apart from any deformity of the limbs; but usually, even in children who have never walked, we may see evidences of rickets in the great prominence of the curvature of the clavicles, appearing as if they had undergone repairs from fracture, and in the curved arm and forearm, resulting from resting the weight of the body on the upper limbs while sitting up in bed; enlarged wrists and ankles, and open or soft fontanels, come to our aid as confirmation. A wasting appearance of the chest and limbs, contrasting with a great prominence of the abdomen, with or without the presence of any fluid, has already been referred to as strongly suggestive of tubercular disease in the peritoneum or mesenteric glands, constituting an affection of special importance in childhood, as it is relatively frequent at this period of life. It is best spoken of as "abdominal phthisis," owing to the frequently uncertain and mixed character of the pathological conditions actually present.

MEAN HEIGHT AND WEIGHT OF 10,904 GIRLS IN THE UNITED STATES OF AMERICA (INCLUDING 3,681 AMERICAN, 3,623 IRISH, 585 GERMAN, AND 1,397 MIXED ENGLISH, IRISH, AND AMERICAN PARENTAGE). DR. BOWDITCH.

Abstract from Roberts' "Anthropometry."

AGE LAST BIRTHDAY	HEIGHT, WITHOUT SHOES	WEIGHT, INCLUDING CLOTHES
5 years	41.0 inches	40 lbs.
6 years	43.5 inches	44 lbs.
7 years	45.5 inches	48 lbs.
8 years	47.5 inches	52 lbs.
9 years	49.5 inches	56 lbs.
10 years	51.5 inches	60 lbs.
11 years	53.5 inches	66 lbs.
12 years	56.0 inches	76 lbs.
13 years	58.0 inches	88 lbs.
14 years	60.0 inches	96 lbs.
15 years	61.0 inches	104 lbs.
16 years	62.0 inches	110 lbs.
17 years	62.0 inches	112 lbs.
18 years	62.0 inches	114 lbs.

Of course, in consumptive diseases, whether in the chest or abdomen, we may have a wasting which involves the belly also in the general atrophy, the whole child presenting a uniformly shrunken appearance. But in quite a part of the affections of this kind, the whole body also may be pretty equally atrophied, as is seen in a multitude of cases of wasting disease arising from malnutrition due to improper feeding or diarrhea, even apart from any consumptive or tuberculous tendencies. The patient's face is small, and assumes the appearance in many ways of that of an old person. A good place to judge of the wasting in a child is in the upper part of the thigh in the region of the great adductor muscles. We may with advantage test the tone of the tissues by pinching up the skin here, the raised fold thus made taking a long time to efface itself in case of wasting and debility; even the skin pinched up on the abdomen may linger as a visible fold to a striking extent.

Along with signs of general wasting, we have often badly-formed nails, or we may find the curving and clubbing familiar to us in phthisical adults. Frequently along the spine, and extending toward the scapula, we see long soft hairs in weakly children, but this sign is sometimes found in those who are fairly strong.

A most important point in the estimation of the development and actual condition of children consists in weighing them.

Mean Height and Weight of Boys and Men between 4 and 50 Years, English Artisan Class (13,931 Observations).

Abstract from Roberts' "Anthropometry."

Age last birthday	Height, without shoes	Weight, including clothes (7 and 10 lbs).
4 years	38.50 inches	44 lbs.
5 years	41.00 inches	50 lbs.
6 years	43.00 inches	54 lbs.
7 years	45.00 inches	57 lbs.
8 years	47.00 inches	59 lbs.
9 years	49.00 inches	62 lbs.
10 years	50.50 inches	66 lbs.
11 years	51.50 inches	70 lbs.
12 years	53.50 inches	74 lbs.
13 years	55.50 inches	78 lbs.
14 years	58.00 inches	84 lbs.
15 years	60.50 inches	94 lbs.
16 years	63.00 inches	106 lbs.
17 years	64.00 inches	116 lbs.
18 years	65.50 inches	122 lbs.
19 years	66.00 inches	128 lbs.
20 years	66.25 inches	132 lbs.
21 years	.....	.....
22 years	66.50 inches	136 lbs.
23-30 years	66.50 inches	138 lbs.
23-50 years	66.50 inches	140 lbs.

It must be remembered that the normal weight varies relatively for the sexes at different periods of life; that in both sexes it varies, of course, with the height; and that with the same sex and the same height, it will vary with the age of the child. The social position of children weighed for the purpose of ascertaining averages likewise has a bearing, showing a greater weight for the more favored classes of society. In the case of very young children, the influence of nourishment by breast milk determines for the most favored class in this respect an increased growth and weight in the early part of life; and it can even be traced as exerting an influence for some years after birth.

This difference as to children nursed at the breast and those brought up artificially, applies chiefly, if not exclusively, to the poorer grades of the community; at least the evidence, so far as statistical data is concerned, applies to this class only, as the other scarcely comes within the chance of such observations being made on a large scale.

But whatever difficulties beset the estimate of a child's weight as

compared with any absolute standard, the relative weight of the child from time to time is a more definite matter. The weight of a child is so small that great care is required in regard to the estimate of the clothing. The best way in routine practise seems to be to determine the weight of the clothes the child wears while indoors, as this leaves the variation from time to time but trifling, although heavier underclothing and heavier shoes make a little difference.

A general falling off in nutrition and weight shows that the opinion of careful mothers and nurses is valuable, particularly in young children, even when the weight might show but little change, as the softness of the muscles, or, on the other hand, their increasing firmness, indicates with considerable certainty the tendency of the case in either direction. The important bearing of a gradual falling off for weeks or months before the onset of dubious cerebral symptoms, is well known in the diagnosis of tubercular meningitis, although in not a few cases this dreadful disease may seem to surprise the child before any falling off had occurred. Likewise, in other obscure affections of a tubercular or scrofulous nature, whether in the lungs, bronchial glands, abdomen, or brain, this preliminary deterioration before pronounced symptoms had appeared, often constitutes a point of capital importance in the diagnosis.

Particulars as to the order and date of the eruption of the milk-teeth will be given in another chapter, so far as these can be reduced to a rule.

The date of walking varies much in perfectly healthy children. Any precocity in this respect is in no way desirable, and no anxiety should be expressed with regard to it if the child is otherwise quite strong and healthy, unless the period goes beyond the fourteenth month, although children in good condition usually walk a month or two earlier. When, however, we find a child unable to walk at eighteen months, the chance of delay being due to rickets is very great, if there are no obvious localized defects in the limbs from paralysis, joint-mischief, etc. Occasionally the inability to walk depends on a general deficiency of the development of the whole nervous system, including a mental defect, to which even when very notable the mother is apt to be singularly or perhaps wilfully blind, enlarging, it may be, on the remarkable acuteness of her offspring.

As in the case of dentition, the child's progress in standing and walking is often arrested, even after a fair start has been made, by the supervention of rickets. "The child is then said 'to have been taken off his feet,'" a report which must always suggest the idea of rickets to the physician. Of course any acute illness may operate in the same way, so that after recovery from measles, a bad bronchitis, or a diarrhea, for example, the child may be found to have lost the power of walking, only to be regained slowly, so that he may appear to be several months behind others of his own age in this respect.

In cases of inability to walk, we must ascertain by a local exam-

ination whether it is due to pain, or dislocation, or any mechanical defect interfering with the process. We also examine for atrophy, coldness, spasms, and other signs of paralysis in the limbs, ascertaining if the child when sitting or lying can move the legs freely. We must also examine the back for curvature and other deformities. We likewise search for rickets, or any sign of rickets, or for indications of mental defects. The case is made clearer if we ascertain whether the child has ever walked.

Precocious development of the sexual organs, or signs of premature puberty, are occasionally seen in children of both sexes. When such are noticed, we must inquire for any unnatural excitation of the parts by the patient or the nurse, or for any evidence of masturbation, which, of course, at that age may assume very unusual forms. In young girls the premature signs of puberty may depend on some ovarian tumor.

EXAMINATION OF THE HEAD.

The development of the child as regards the bony system has been alluded to in connection with the distortions of rickets. The size of the head varies enormously, and it is not possible to give absolute measurements of any great diagnostic value. The size of the head depends, of course, very much on the parentage of the child, but it is often too large, and sometimes unduly small in disease.

In rickets the head looks large and the face small. The top of the head is usually rather flat, and sometimes gives the idea of a square shape. The fontanels are often much wider than usual for the age, and may indeed remain unclosed, or covered only by a soft membrane for a year or two after they should be closed. Whenever such conditions are found in the skull we search for other signs of rickets; in the chest for the characteristics of distortion and the so-called "beading" of the ribs; for curves of the bones of both upper and lower extremities; for the actual state of dentition and the history of the same; the date of walking, or going over walking; and also for tenderness in the bones on handling the child. All these particulars come in to help the diagnosis. Rickets has such wide-reaching effects, and has, in particular, so important an influence on nervous disorders, that the large head may readily lead the inexperienced to ascribe laryngeal spasms and general convulsions to some grave disease of the brain, while really the case is essentially due to rickets, and perhaps readily curable.

In examining the skull we may find thickened masses or bosses around the fontanels especially, or, on the other hand, thinned portions of bone, soft or almost approaching to the character of holes (cranio-tabes). Both conditions have been described by Parrott as occurring in rickets, but as he considers this disease a manifestation of syphilis, we require to remember this in connection with the detection of similar conditions in congenital syphilis.

The enlarged head of hydrocephalus usually differs from that of

rickets so clearly that mistakes do not often arise after a careful examination. The upper part of the head is not flat, but often arched or vaulted. The fontanel is not merely wide or unclosed, but often prominent and tense. The sutures issuing from it are frequently wide, with a protrusion between the edges of the bone. The face looks small in comparison with the head, and there is a peculiar downward look of the eyeballs, with, from the same cause, an unduly large part of the white sclerotic visible in the upper segments. The enlargement sometimes remains as a permanent record of the occurrence of hydrocephalus in the past, the illness having run its course, and the sutures and fontanels being all firmly closed. In such cases the intellect may be defective, presenting the form of idiocy called macrocephalic; but enlargement of the head in this way by no means involves mental deficiency as a necessary consequence.

Smallness of the head is no less serious a sign than enlargement, and when extreme, it is often associated with idiocy (the "microcephalic" form of some writers). Moderate degrees of smallness must not be judged of rashly; for, if the development and shape are otherwise good, this may result from family peculiarities of little import.

Occasionally unilateral alterations in the skull are detected as connected with obvious or obscure disease in the central nervous system; while unilateral atrophy, or more rarely unilateral hypertrophy, may lead to a want of symmetry, dating, it may be, from birth. Another form of want of development of the side of the head and face arises in connection with long-standing wry-neck in early life, and a slighter form has been ascribed to injurious modes of carrying the infant, so as to hinder free movements in all directions.

The occurrence of the "blood tumor," called cephalæmatoma, appearing in the scalp of the infant soon after birth, can easily be distinguished from the much more serious disorder due to defect in the bones of the skull, with protrusion of the brain substance or membranes, to which the name encephalocele is applied. We will speak of these occurrences later on in this work.

EXAMINATION OF THE NECK.

Examination of the spine of children reveals, at times, the two well-known forms of curvature with which we are familiar in the adult. Acute or angular curvature, described by Pott, occurs indeed with special frequency in early life, and its appearance is so characteristic as to require little notice here.

Lateral curvature is, of course, much less common in children than in girls at or beyond the age of puberty. But a typical lateral curvature may occur even in young babies; and in such cases we must see whether there is an error in habitually carrying the child so as to look in one direction only. Very often the lateral curvatures in children are merely secondary results of serious antecedent disorders. A

pleurisy followed by retraction of the side, an infantile paralysis, grave hip-joint disease, fractures or dislocations in the leg or thigh, and indeed anything which shortens one of the lower limbs as compared with the other, may give rise to lateral curvature of the spine.

A very common curvature found in young children may mislead the beginner by suggesting the presence of caries with Pott's curvature, when all that exists is simply softness of the bones and muscular weakness, such as occurs so frequently in rickets. In these cases the back in the lower dorsal and lumbar regions is found to bulge or curve backward when the child is made to sit. There is no true angular projection, and on taking the weight off the spine by the recumbent posture, the curvature disappears.

An opposite curvature of the lower part of the column, with a hollow instead of a projection, gives the spine a "saddle-back" appearance in this situation. There is a projecting backward of the upper part of the spine about the scapulæ, and the name "lordosis" has been applied to this variety. The deformity is due to paralysis or weakness of the muscles of the back, and it acquires special significance in the diseases of childhood from this "saddle-back" constituting one of the most striking features of the pseudo-hypertrophic muscular paralysis, an affection which we may say is limited to children.

The peculiar fixity of the head and neck found in occipito-atlantoid diseases needs only to be noticed in a word. It occurs with relative frequency in childhood.

The congenital malformation termed spina bifida requires also to be mentioned here. Its presence may account for paralysis and convulsions in infancy. The gravity of the condition turns in part on the level at which tumors exist in the spine, and in part on the nature of the contents.

TEMPERATURE—THERMOMETER.

The introduction of the thermometer into regular clinical work has been of signal service, and especially in dealing with children. A child with a measly or a scarlet rash may be found to have, on some rough observation, a temperature of 102 degrees Fahrenheit. This may be enough for the purpose of diagnosis, showing that with the rash there is a distinct degree of fever; and if the child is not very ill, it may really matter but little whether the temperature is 102 degrees Fahrenheit, or whether, if properly taken, it might come out 103 degrees Fahrenheit or 103½ degrees Fahrenheit. Of course a very great elevation (106 degrees or 107 degrees Fahrenheit) might mean something very different; but in such a case the obvious state of the child would likewise be different.

Formerly this was determined, in part, by the hand applied to the child's skin, say over the abdomen, and in part by the counting of the pulse. The hand applied to the skin is considered confessedly a

rough method; but when the sense of increased heat is very notable, one of experience may get considerable assistance from it.

But in dealing with instruments of precision, such as good thermometers, we are exposed to new fallacies if we do not use them properly.

It is when, perhaps with a low surface temperature, there is a very distinct increase of the internal heat, that errors from faulty observation become positively misleading, when, for example, we may be dealing with a case of enteric fever toward the end of the first week, and the thermometer, badly applied, shows a maximum of only 100 degrees Fahrenheit instead of 102 degrees Fahrenheit. We might here almost infer that enteric fever was excluded by such observations, if we trusted to the "instrument of precision." Or the hectic fever of obscure phthisis may be present, but missed by a faulty use of the instrument; and so we might be led, if trusting to the record, to set aside the diagnosis of phthisis as unlikely, owing to the supposed absence of the fever which we had really failed to discover. Such mistakes are constantly being made, and the educational effect on those who make them is toward carelessness, inaccuracy, and confusion. The temperature should be taken in the rectum as well as in the axilla.

A child's axilla is often a very small affair, and especially when wasted there is scant covering even for the bulb of a thermometer. The instrument readily slips out behind, or falls down, or the arm ceases to be applied. To obtain correctness in this, we must see that the axilla is closed; and in young children this means that the observer must hold the arm to the side himself. Keep the axilla closed to the child's armpit, and push all clothing back from the thermometer, and bring the child's arm down over the thermometer, and hold the arm for five minutes close over its body until we feel sure that the maximum is reached. At times the maximum is reached in one minute, and by waiting four minutes longer we have the security of this being the maximum.

In scarlet fever it is very likely we get a rapidly-attained maximum in the axilla, particularly if the arm happens, as it should be, to be close to the side, as by the child's lying on it; but if the arm has been moved from the side, or tossed about so as to take up colder air into it frequently, if the child is wasted to "skin and bone," if with the feverishness there is a tendency to collapse, then we have to wait until the influence of the cooling air on the skin is neutralized by the increased cutaneous circulation, favored by the apposition of the arms to the side. In this way, a long time may be required for taking the temperature. Temperature observations can be taken in the rectum rapidly, and with great precision, in from three to four minutes. The child is placed on the left side, in bed or on the mother's knees; oil the bulb and introduce it into the bowel for a couple of inches, keeping the buttocks closed while taking it, and carefully covered to avoid undue exposure. The observer should hold the ther-

mometer and place the other hand on the pelvis, to guard against sudden movements displacing the instrument. Often, in from one to three minutes the maximum is reached. The rectum, of course, must be clear of fæces, to obtain correct temperature. It must be remembered that in children there is a daily curve of temperature, and that to be even roughly comparable, the hours of observation, from day to day, must be approximately similar. In serious cases, or in connection with therapeutic measures, we may wish to know how far the high temperature is continuous, or to what extent remissions occur from hour to hour. Observations of the temperature should be made every two hours, to the form of the curve, or rise and fall of temperature.

The temperature in healthy children can not be correctly spoken of as either higher or lower than in adults. It is in a sense both. The daily range is greater, amounting to about 2 degress Fahrenheit or even 3 degrees Fahrenheit. The minimum in health is attained shortly after midnight, and the maximum in the afternoon. The temperature falls rapidly in the evening, about the time the child goes to sleep. It may range from 97 degrees Fahrenheit to 100 degrees Fahrenheit in the rectum in healthy children.

The following table may be found useful as a guide:—

Very low or collapse temperatures:—
Below 35 degrees Centigrade, 95 degrees Fahrenheit.
Below 36 degrees Centigrade, 96.8 degrees Fahrenheit.
Subnormal temperature:—
About 36½ degrees Centigrade, 97.7 degrees Fahrenheit.
About 37 degrees Centigrade, 98.6 degrees Fahrenheit.
Normal temperature:—
Normal, 37 degrees Centigrade, 98.6 degrees Fahrenheit.
Slightly above normal, or subfebrile temperature:—
About 37½ degrees Centigrade, or 99.5 degrees Fahrenheit.
About 38 degrees Centigrade, or 100.4 degrees Fahrenheit.
About 38½ degrees Centigrade, or 101.3 degrees Fahrenheit.
Moderately febrile temperature:—
About 39 degrees Centigrade, or 102.2 degrees Fahrenheit.
About 39½ degrees Centigrade, or 103.1 degrees Fahrenheit.
Highly febrile temperatures:—
About 40 degrees Centigrade, or 104 degrees Fahrenheit.
About 40½ degrees Centigrade, or 104.9 degrees Fahrenheit.
Hyperpyretic temperatures:—
Above 41 degrees Centigrade, or 105 degrees Fahrenheit.

Very high temperature (above 106 degrees Fahrenheit) and very low temperatures (under 96 degrees Fahrenheit) are necessarily fraught with danger; but a sudden rise of temperature (to 104 degrees or 105 degrees Fahrenheit) may sometimes give ground for hoping that we are dealing with a trifling febricula; on the other hand, a moderate temperature (102 degrees to 103 degrees Fahrenheit), with

cerebral symptoms, may, just because of its moderation, give rise to the most grave apprehensions of a deadly meningitis; whereas a higher temperature (say 105 degrees or 105½ degrees Fahrenheit) might give reason to hope that the cerebral symptoms were dependent on an incipient pneumonia or some less fatal disorder. The figures must be interpreted not only in view of the other symptoms, but also in view of the other known facts of the medical thermometry.

Pulse.—The pulse in childhood has ceased to be regarded as any great criterion of the degree of fever, having been, in a great degree, superseded by the use of the thermometer; but the value in many other ways is still very great. The pulse is a guide in estimating the general strength of the patient, although we are liable to make mistakes in relying unduly on this sign. The correlation of the pulse and the temperature is often very suggestive. At the beginning of enteric fever we may have a pretty high temperature (say 102 degrees to 103 degrees Fahrenheit) with almost no elevation of the pulse-rate, and the apparently cool state of the skin may lead the physician to omit taking the temperature at all. Toward the end of such a fever, the pulse may be higher in proportion than the temperature, and it may continue, probably through weakness, to be very high even after the defervescence is complete.

A slowness in the pulse has often a great significance in the diagnoses of cerebral affections, and especially of meningitis. At the beginning of the illness, with distinct elevation of the temperature, we may find the pulse rapid; but with the advance of the disease, the temperature may fall, and the pulse may become extremely slow (say about sixty beats per minute). With the further advance of the disease, after the temperature has become almost normal, we may find, a day or two before death, the pulse running up to an almost uncomfortable height.

Closely allied to slowness, is irregularity and intermission in the pulse. This, also, occurring with headaches, sickness, moderate fever, or other signs of meningitis, is always of grave import. The irregularity is of two kinds, and both are found in meningitis. We may have intermission in the pulse, a beat being lost every five or ten or twenty beats. This occurs also in brain diseases of various kinds.

Irregularity and intermission of the pulse occur in other than in brain disorders, notably in cases of pericarditis in its early stage, and also in acute endocarditis. Probably on this account we have irregularity in the pulse not uncommonly in chorea. Of course, it is often present, as in the adult, in valvular disease of the heart. In extreme stages of feverish illness, a flickering, or irregular, or intermittent pulse, indicates the grave condition of the patient, but in such cases the diagnosis is already made, as a rule.

Physiognomy.—The idea of defining special temperament and diathesis from the general aspect of the patient is now abandoned by most physicians. The significance of pallor as a sign of anæmia is

recognized, as in the adult, by a comparison of the color of the mucous membranes, or, if need be, by actual testing of the color of the blood, and by ascertaining if the general symptoms of anæmia, such as breathlessness, giddiness, etc., are present, or by physical examination of the veins and heart for anæmic murmurs.

The presence of jaundice in children is recognized as in the adult. Of this we will speak later on in this work.

But apart from obvious jaundice, we sometimes see a dark complexion allied to it, leading one to feel that those with this "bilious temperament," as it is often called, are especially liable to digestive disorders, with a tendency to great feverishness and headache in such attacks; while with a blonde or florid complexion we often see that children are especially liable to great cerebral excitement and delirium from very trivial ailments.

The appearance of flushing in feverish illness of all kinds; the combination of flushing and duskiness in suffocative bronchitis, advancing through various degrees to that of alarming lividity; the combination of duskiness and pallor in the face with coldness of the surface; the successive redness, blueness, and blackness perceptible in bad paroxysms of whooping-cough; the extraordinary blueness aggravated by crying, seen in the cyanotic state, "morbid cerulean," of children affected with congenital malformations of the heart,—all these are physiognomic features of the utmost value.

Sweating is a common feature in certain stages of febrile disease, whether in children or adults; and the cold sweats of exhaustion also occur in childhood. But in rickety children very profuse sweating of the head and neck, especially when the child goes to sleep, may occur in the most extreme form without any fever whatever.

Distention of the veins of the face and neck may occur to a notable extent in all forms of difficulty of breathing or dyspnœa, and in cases of croup the outstanding veins in the neck often form a serious impediment in the performance of tracheotomy. The appearance of the child lying asleep with eyes half open, has, since the time of Hippocrates, been regarded as of bad omen, and indicative of grave brain disease; but now it is considered a mistake to attach much importance to this state of the eyes.

The characteristics of the appearance of febrile rashes will be dealt with later on in this work.

The Cry.—Crying immediately after coughing suggests the idea of pain being caused thereby, as in pleurisy, pneumonia, and some forms of bronchitis. A moaning is a clear indication of local suffering or of general distress, more so than the lusty cry of mere irritability, sleepiness, or bad temper. Crying, with wriggling movements of the pelvis and legs, has been regarded as a sign of colicky pain. Loud crying seems to be due to pain in the kidneys or bladder from gravel.

Continuous crying or screaming is so often found to be due to earache that this should always be thought of in obscure cases; and the

result of the examination of the ears, or decided relief from hot narcotic applications, may clear up the diagnosis; or perhaps the alarming symptoms simulating meningitis may disappear after the discharge of matter from the ears.

In croupy affections the cry may be hoarse. A child is more likely to cry from thirst than hunger; especially in feverish cases is thirst much greater.

The absence of crying is often of graver import than its presence. The sick child, ill and exhausted beyond endurance, may only wrinkle up the lips as if to cry, without any sound; or in bad pulmonary cases, or even in rickets, the child may not be able to spare the breath required for the cry; and in the stupor and coma of brain disease the child is only too quiet.

After the child is three or four months of age, the absence of tears during crying is construed as a bad sign. Something of the same kind is often seen in adults. "The dying weep not."

CHAPTER XIV.

DIAGNOSIS OF CHILDRENS DISEASES (Continued).

DROPSY.

Dropsical swellings are not very different in children from what they are in adults. General anasarca of renal origin is relatively common at this age, partly on account of the frequency of scarlatinal dropsy, and partly because of parenchymatous nephritis specially affecting young subjects. Whenever a child appears with suddenly-developed anasarca, we are bound to think of scarlet fever; we look for signs of desquamation on the fingers and elsewhere; and we inquire for a history of sore throat, red-rash, etc. Any mistake in missing the diagnosis of scarlet fever in such cases may be disastrous as regards other children. Once in a while there is a case of genuine renal or scarlatinal dropsy without a trace of albumen in the urine.

In scarlatinal dropsy, and, indeed, in other forms of acute or subacute nephritis in children, even it may be with dropsy, we must always be on our guard, lest a supervention of acute pleuritic or pericardinal effusion, or the occurrence of uræmic convulsions, should come on under circumstances which might aggravate the condition, or give rise to painful reflections of these being caused by indiscretions.

The dropsy of heart disease does not differ in the young, in any notable manner, from what we see in the adult.

Oedema of the feet or of the eyelids in young children is no uncommon thing as a result of anæmia, with, perhaps, feeble circulation, but without renal or cardiac disease. It may occur in chronic diarrhea or other chronic illnesses. We see a more peculiar form of the same thing in the swollen state of the hands and feet, the swelling being so tense as not to pit on pressure. A somewhat similar condition, with hardness and swelling more extensively distributed, has been described in newly-born or very young children, under various terms ("induration of the cellular tissue," "sclareme," "hide-bound"). It may be complicated by a low temperature, and by great disability, and is indeed a most dangerous condition.

As in adults, obstruction to the circulation in the chest may give rise to œdema of the upper part of the body and arms. In children, tumors in the mediastinum, giving rise to such symptoms, are usually of glandular nature.

Subcutaneous emphysema, from the rupture of air-vessels in whooping-cough, or other diseases, may seem at the first glance to resemble œdema; but the crackling sound and sensation on testing the parts for pitting, and the resonant percussion, prevent mistake.

GENERAL PAINS, AND PAIN IN THE LIMBS.

Pain in the head, chest, back, or abdomen, when it can be localized by the child's language or signs, serves, of course, to guide our examination. At times they are present, but undescribed, and the only indications we get are from the expression of pain in the face, or from the cry, and from the apparent aggravation on moving or pressing certain parts. Elsewhere, persistent crying has been spoken of as due to persistent earache.

Sometimes the discomfort, as in the adult, is too general to be defined, although extreme enough. In rickety cases, the tenderness is in the bones and muscles, and is developed on handling the child or disturbing his position. In cerebral meningitis, there is great general hyperæsthesia, with special pains on moving the neck and limbs. In cerebral-spinal meningitis we sometimes have a complication of rheumatism, and cases of this alarming disease are sometimes put down as rheumatic ailments of no great severity, owing to the absence of any swelling in the joints.

Rheumatism in childhood is at times rather difficult of recognition, as the articular affection is only slight, and perhaps contemptuously spoken of as "growing pains," although such trivial attacks are often associated with endocarditis, leading to permanent mischief in the heart. At times the pains are almost limited to the feet and heels, with some stiffness in the muscles. In other cases, of course, acute articular rheumatism may be plain enough, but in children under six or seven years it is not common to have it in a glaring form. As in adults, pains more or less distinctly rheumatic may occur with an eruption of purpuric spots.

Another disease, sometimes erroneously called rheumatism, is acute periostitis, or necrosial fever. In the early stages, this is often thought to be typhoid fever, when the pain in the limbs is trifling, and is often supposed to be rheumatism when the pain is more pronounced. The disease frequently advances to suppuration before it is recognized as periostitis at all. The tibia is the most common bone affected, but others also are attacked.

The red spots of erythema nudosum may give rise to much pain with feverishness. They often occur in rheumatic subjects.

The pain in the limbs in the early stage of infantile paralysis often leads to a misconception of the nature of the attack, and affections of the joints may be suspected, and especially the diagnosis of the hip-joint disease is sometimes made, with, it may be, disastrous results in the subsequent treatment. But joint affections also occur only too frequently in children, with pain and swelling; scrofulous disease in particular must always be borne in mind. Although it is a rare affection, hæmophilia, or the hæmorrhagic diathesis, frequently gives rise to joint affections in children, with painful swellings, due probably to effused blood.

Glandular swellings are also sources of pain, especially in the groin and in the neck. In the latter situation, the pains arising from them may simulate rheumatic affections of the muscles, or they may give rise to distortions resembling tosticallis; from the violent shooting pains going up to the head, grave cerebral mischief may sometimes be apprehended. The glandular swellings are not always easily felt, but when enlarged and tender glands are detected, the explanation of pains and feverishness may be at once obtained in otherwise very alarming-looking conditions.

FAMILY HISTORY—HEREDITY.

The family history is of capital importance in the study of children, for it is often by the known tendencies of the disease in the individual and in the family that we interpret the meaning of existing symptoms.

The best way is to ascertain all the facts known to our informant regarding the ages of the parents and of the brothers and sisters, if they are alive, their state of health, and their liability, past or present, to any ailments. If there have been deaths, we ascertain the causes of death, and the age at death. We often require, also, to get particulars as to the duration of the illness and the leading symptoms, so as to compare these with the name assigned to the disease. In cases of suspected syphilis we have much light thrown on the nature of the illness by a history of repeated abortions in the early months of pregnancy; then of still-births at the full time; and then, as the intensity of the disease seems to lessen, of living children born with congenital signs of syphilis. After all such information is obtained, we have often to make inquiry as to other relatives, particularly the grandparents and the uncles and aunts on both sides. When we have definite suspicion of the nature of the illness, as in case of tubercular disease, rheumatism, cancer, diabetes, etc., we inquire especially as to these, giving a variety of names, so as to help our informants, asking if any such cases occurred among the relatives named.

Tubercular tendencies are so important and manifold in the diseases of children that we have to make special search for them, including all sorts and forms we can think of, under various popular names. The influence of a mother's phthisis seems more potent than a father's in transmitting such an affection.

In the case of cancer, with which probably other malignant tumors should be grouped for this purpose, we must remember that although affecting at times even very young children, cancer is notably a disease of advanced life, and that children may inherit the tendency from parents in whom, or in whose brothers and sisters, it may not yet have had time to appear, although no case may have occurred in the parents or in their brothers or sisters. The history of the grandparents and of granduncles and of grandaunts may come in to clear up the mystery.

This disease is always transmitted in the female line, but only to male descendants.

In the case of the so-called ataxia (Freidereich's disease) we have the same nervous affection occurring in various members of a family, although the fact of actual transmission is not made out.

The combination of the constitutions of the two parents may determine peculiarities unknown to either of them. The injurious influence of consanguineous marriages may also be explained in some such way, the influences for evil in a family being intensified, instead of lessened, by the marriages of near kin. Further, when both parents, although of different families, are consumptive or rheumatic or neurotic, the danger of transmission is no doubt much greater, if for no other reason than that there is thus a double chance of transmission, or a double portion of the same inheritance.

In rickets the disease has often the appearance of heredity, from several children being affected in the same family, and it is notable that the later children in certain families seem especially prone to this affection. The explanation is probably not to be sought in heredity, except in so far as a mother of a large family in poor circumstances, is liable to have had her health run down by work, anxiety, and child-bearing; but the children in such a family are, of course, all likely to be exposed to similar unhealthy surroundings, and with the increase in their number the mother is less able to take them out in the open air, or to attend to them in the special manner in which she could when there were only one or two in the family.

Pseudohypertrophic muscular paralysis is notably a family disease; although not traceable in the parents of the affected children, it may show itself at times in the uncles as well as in the brothers of the patient.

The tendency to transmission of a disease to children born after the parents have had the affection themselves, seems to be more potent than in cases where the children were born before the parents were so affected. In the case of syphilis in a father, we can see at a glance that it is only after the parent has had the disease that it can be transmitted. All the earlier children are quite unaffected. We can even understand that in the case of a mother actually affected with advanced consumption during her pregnancy, the child thereafter born is more likely to be affected than those who were born before the mother's health had broken down. But it is not so intelligible, it would seem to be made out, that in the case of gout, of rheumatism, and probably some other affections, the parents, although capable of transmitting these diseases to their offspring before they have had overt manifestations of them in their own persons, are more likely to transmit the diseases, or to transmit them to a greater intensity, to those born after they themselves had been affected.

Transmission of diseases and disease tendencies is not as yet fully worked out. We can easily understand that such manifestations as

hip-joint disease, tubercle in the brain, and tubes-mesenterica may all be reduced to one common inheritance, and that these occurring in the brothers or sisters of a patient, or in his uncles or aunts, may throw light on cases of mischief in the pleura, pericardium, or lung, or on many other tubercular affections in other members of the same family stock.

Rheumatism, growing pains, chorea, and heart-disease form another group of hereditary ills, which may be classed with hysteria, epilepsy, and insanity. In many cases there is such a neurotic group; and probably a liability to a bad or generalized neuralgia, bad headache, and general excitability should be included as the result of the inheritance of an unstable nervous system, which, however, is quite compatible with great quickness of intellect and general ability.

These nervous diseases seem to replace one another in the history of the individual at different periods of life, or in different members of his family. It is extremely probable that inheritance of a bad nervous system predisposes not merely to alcoholism, but also to criminal courses of life, and that children of drunkards and of the criminal classes come into the world biased toward evil courses, which may take the form in them of more definitely recognized diseases.

Rheumatism has already been referred to, but it has also other affinities. The rheumatic and gouty inheritance may show itself in the children's being liable to psoriasis and eczema, to uric-acid gravel, and, it may be, calculus, or to asthma and to asthmatic bronchitis. Uric-acid calculus is a disease known to be often hereditary, without, perhaps, any connection with other diseases being ascertained.

Gout is practically unknown in childhood in its articular form; but we may see the little pearly deposits in the ears; and in addition to some of the ailments mentioned in the last paragraph, we may see granular kidney. In any case, this granular, or so-called gouty, kidney may appear as an hereditary disease in certain families, declaring itself even in early life.

Saccharine diabetes in children, although rare, can often be traced as hereditary disease, as in the adult we can sometimes see a relationship between diabetes and phthisis pulmonaris, or other tubercular disease.

Malformation of all kinds can often be traced, occurring in different generations of the same family; the same is true as to the family peculiarities of build and features.

Intermediate between congenital malformations and inherited diseases we may place deaf-mutism and congenital color-blindness, although exact structural defect may evade our recognition.

Catarrhal tendencies are undoubtedly transmitted. These may lead to wheezing condition in the chest or to nasal catarrh, favoring, for example, affections of the tympanum from this cause, with its attendant deafness, so often found to run in families.

But, further, special families are liable to attacks of the acute

specific fevers; and when they appear, there is apt to be a special severity in the disease. We may thus trace a severe type of diphtheria or enteric fever, with perhaps grave intestinal hemorrhages, as occurring in different members or generations of the same family, at such intervals of time as to preclude the idea of any common infection, and yet with such frequency and severity as to make the idea of special liability irresistible.

THE NERVOUS SYSTEM.

Among the disorders in the nervous system we have paralysis in various forms, but some varieties common in the adult are rare at early ages. Thus hemiplegia from ordinary hemorrhages or degenerations such as occur in advanced years, is scarcely known. But hemiplegia does occur, and is sometimes suspected to exist when the disorder is really due to something else. Thus in chorea, really a convulsive disorder, we usually have more or less of power, and when the affection is unilateral, the loss of power is unilateral also. When by some chance the twitchings are not very plain, or when, as happens rarely, but still occasionally, the loss of power precedes the twitchings, and the child is brought complaining of a somewhat sudden loss of power in one arm or in one side, we may, by careful examination, be able to make a diagnosis of chorea, and so remove much of the anxiety felt at such an occurrence.

One-sided paralysis in children is often dependent on cerebral tumors, usually tubercular; but the presence of staggering and more general weakness often takes away from the precision of the hemiplegia. In children with one-sided paralysis dating from birth, we must always think of the possibility of some hemorrhage or other lesion from injury to the head at parturition or birth. This is apt to be followed by atrophy of the brain on the affected side, and by a spastic state of the paralyzed side. A bilateral lesion may give at times a bilateral hemiplegia, if such a term may be used, with a most remarkable shuffling gait. Paralysis of one arm or of one leg (monoplegia) from infantile paralysis may occasionally suggest the idea of hemiplegia, particularly if the two limbs on the same side are implicated in the attack. The idea of a cerebral lesion may be suggested, although the disease is known now to be of spinal origin. All the more likely is such a mistake to arise if convulsions have ushered in the attack. Meningitis and abscess of the brain occasionally give rise to one-sided paralysis; but usually the case is too complicated to be spoken of as hemiplegia. In whooping-cough we may have, although rarely, small hemorrhagic lesions in the brain, due probably to the paroxysmal fits of coughing; with these we may have aphasia as well as hemiplegia. Hemorrhage on the surface of the brain or into its membranes is more common than marked hemorrhagic lesions in the brain substance. When children with meningeal hemorrhage

survive the shock, there may be paralysis of one side, and the post-mortem examination may show the presence of false membranes.

Paralysis of a limb, or of part of one side, is not very common as a sign of cortical lesions in the brain, often associated with convulsions limited to the same part. In the paralyzed limbs of hemiplegiac children there is often a tremulous or shaky state, especially noticeable when the arm is used. Such cases are often due to cerebral tumor.

Paraplegia in children is usually dependent on caries of the vertebra, which is relatively common in early life. Its features are not specially different from those seen in the adult. Of course spina bifida may give rise to a form of paraplegia special to children. Diphtheritic paralysis is relatively common in childhood; but it usually affects the palate, and the accommodation of the eye, more notably; it may assume the paraplegic type; or the whole muscular system of the body may seem implicated. Other specific fevers are also occasionally followed by paraplegia.

Epidemic cerebro-spinal meningitis is not uncommon in children when the disease is present in a community. The most striking features, in addition to headache, vomiting, and fever, are the severe generalized pains in the back and limbs, with great suffering on handling the child; the presence of retraction of the head and neck, which is often extreme; the occurrence of herpetic or purpuric eruptions on the body, and the implication of the eye and ear.

The pyrexia is more intense and persistent than in the ordinary tubercular-cerebral meningitis. After the lapse of a few weeks, recovery may take place from a condition which seemed quite hopeless; but deafness or some other remnant of the disease may be permanent.

Infantile paralysis, to its pains, feverishness, sudden loss of power, and rapidly developed atrophy and coldness of the limbs, etc., will be spoken of later on in this work. The localization of the paralysis, when not absolute or extreme, is different in the upper and the lower limbs. In the arm, it is usually in the upper part, which is badly paralyzed, the muscles of the forearm and fingers regaining in time considerable power; in the leg, it is especially the muscles below the knee, which are weak and atrophied, those of the thigh being often pretty sound. As it well known, the sensation is not affected in infantile paralysis, and the sphincters almost never. Pain in the early stage of this affection often leads to erroneous ideas, suggesting hip-joint disease and various other painful disorders. Very often the true diagnosis is not suspected till the paralysis is detected, when the child is supposed to have recovered from the acute disease.

A form of paralysis limited to children, or at least always beginning in early life, is the pseudohypertrophic muscular paralysis described by Duchenne. It tends to occur in certian families, although really a rare disease. The child begins to fall easily, and his companions often amuse themselves by knocking him over, as the process

of rising is difficult, and, in a sense, comical. The abdomen stands out, from the presence of the saddle-back curvature in the spine, and the child's manner of lifting the feet suggests a resemblance to the walking of a turkey. The limbs, instead of being wasted, appear as if hypertrophied, in the early stages at least, and the calves of the legs are especially prominent. The hypertrophy, however, is spurious, and the limbs are really weak.

Aphasia has been found again and again in children, under circumstances pointing to a lesion of the brain in the usual situation, but it is far from being so common as in the adult.

Affections of the speech, and other symptoms closely resembling those found in bulbar paralysis, usually prove to be due, in children, to tumors involving the floor of the fourth ventricle, as the regular progressive labio-glossa laryngeal paralysis does not occur in early life.

Paralysis of the cranial nerves is common in childhood. The portio-dura of the seventh pair of nerves is often involved in ear-disease at this age. In young children, this nerve may be affected from acute suppurative inflammation in the middle ear without destruction of the nerve, as proved by the subsequent recovery. The other causes of peripheral-facial paralysis are also operative in childhood, but do not call for a notice here. Facial paralysis of central origin occasionally dates from an obscure affection in early infancy, pointing to cerebral disorder. In this last case, the paralysis, although of old date, does not prevent the muscles from responding to the Faradic current perfectly.

Paralytic affections of the ocular muscles, with squinting, immobility of the eyeball, lateral deviation, and nystagmus, are very common in childhood in connection with cerebral tumors. These affections must be studied and worked out in detail, just as in adults, so far as the child's condition and intelligence render this possible. In childhood the occurrence of squinting may be readily brought about by any acute illness, so as to occur at a particular time, although from errors in the refraction of the eye its appearance sooner or later might be inevitable. In such cases, of course, the squint is not paralytic.

Affection of the optic nerves comes under the head of specialities.

Marked intolerance of the light, with spasms of the eyelids and lachrymation, always suggests the idea of keratitis or kidney trouble, and we may have photophobia from this cause without lachrymation. In various brain affections, and especially in meningitis, the child often shuns the light without any local affection of the eyes, the headache being intensified by any bright light.

The state of the pupil has often to be examined in children. During healthy sleep, the eyeball is drawn upward and inward; but if the lid is raised, the pupil is found contracted. If the child awakes during this examination, the pupil dilates with the awakening, but contracts immediately upon its exposure to the light. Immobility of

the pupil on exposure to light may be taken as an index of blindness, if the pupil is of normal size.

Enlargement of both pupils is common in cerebral meningitis with effusion into the ventricles, but, as in the adult, some of the most grave cerebral lesions produce contractions. Enlargement of one pupil is common in paralysis of the third nerve, usually with other signs of this nerve's implication. Inequality of the sympathetic, from paralysis, shows itself by contraction on the affected side, or rather by a want of dilatation on shading; it may occur in spinal cases involving the cervical region, or from other implications of the sympathetic in the neck.

Oscillation of the pupil under the stimulus of light, so that it contracts and dilates while the light is held steadily before the eye, is not uncommon in children with meningitis. In opium narcosis, contraction of the pupil is a valuable guide.

Enlargement of the pupil from atropine applied locally, usually, of course, affects only one side, but during its internal administration, if pushed, both pupils are enlarged and somewhat imperfect in their response to light.

Tubercular meningitis is one of the most alarming diseases of childhood, and in its early stages, one of the most difficult for diagnosis. We will here make some allusions to the frequent difficulty experienced in deciding whether a case is one of meningitis or of enteric fever. In both we have fever; in both oppression or excitement, or, it may be, coma; and in both we have a congested state of the lungs. The points which aid us are: (1) That in enteric fever sufficiently severe to cause cerebral symptoms, the temperature is usually very feverish; whereas in tubercular meningitis, after it produces marked cerebral symptoms, the temperature is usually moderate. (2) In tubercular meningitis the child has usually been failing in condition before the acute symptoms come on. (3) The state of the abdomen and bowels may guide us, not merely as to looseness, although this is so extremely uncommon in meningitis as to count for much, but more particularly as to the tumidity of the abdomen. It is rare that this is entirely absent in enteric fever, while in meningitis the abdomen is seldom full, often flat, and sometimes retracted. (4) The family history, and (5) the mode of onset also help us.

Another condition sometimes confused with meningitis is "hydrocephaloid disease," due to exhausting illness, and especially to diarrhea. In both diseases the child may lie in the same apathetic condition, with little or no fever. The history of diarrhea, with the vomiting, may often guide us; for, as has already been said, this is a rare complication in meningitis. The collapsed fontanel in young children may also often guide us, for it is in them that mistakes are most likely to occur.

Convulsive diseases are of special importance in childhood; for they occur not merely as complications of grave disorders of the

brain or from uræmia, as in the adult, but also as manifestations of general disorder and disturbance. Thus, in acute fevers or in pneumonia, there may be convulsions ushering the illness or occurring during its progress. As Dr. West puts it, "In a large proportion of cases, convulsions in the infant answer to delirium in the adult." This is a most suggestive view, when taken in connection with the demonstration of motor centers in the cerebral convolutions. But in early life errors in diet or disorders in digestion, which in adults might be called trivial, may give rise not only to diarrhea or vomiting, but to violent convulsions. No doubt some special susceptibility may exist in the nervous system to favor such an occurrence in some children or families rather than in others; and in connection with rickets, this predisposition undoubtedly exists in many, so that trivial disturbances, not always easy to trace, reveal themselves by convulsive attacks. In connection with violent spasms of the glottis—itself a convulsion—whether in whoping-cough or in laryngismus stridulus, we often see general convulsions supervening. In cases of prolonged diarrhea or other forms of exhausting disease, we may have convulsions apparently in the same way as from the loss of blood.

Scarlet fever may have been so slight as to pass unrecognized, or at least to be little regarded; the renal complications may also have been little, if at all, thought of, till sudden uræmic convulsions may startle all concerned. Those physicians who have been once surprised are usually very careful to see that nothing is wanting in the care of scarlatina convalescents.

Convulsive movements of the face and limbs, with erratic behavior of the voluntary muscles when called into action, are characteristic of chorea. This is essentially a disease of childhood. It may, however, appear in those who have attained puberty in both sexes, although very uncommon in young men. It is less rare in girls of this age, but usually then occurs as a relapse. It is well known, also, that it may complicate pregnancy, usually as a recurrence. However, not a few diseases, termed chorea, are entitled to be called so. The post-hemiplegic chorea already referred to, which is not limited to children, clearly points out grave mischief in the brain; and, no doubt, some other of the chronic forms of chorea point in the same direction. Occasionally a tremulous, jerky state of the arm may simulate chorea pretty closely, although really constituting an early symptom of cerebral tumor. Whenever chorea departs from its known characteristics as regards age, duration, localization, and concurrent symptoms, we must always suspect that something worse may be actually present.

We will not discuss the diagnosis of epilepsy here, but will elsewhere.

A remarkable form of convulsion limited to children is that known as eclampsia nutans. These "nodding convulsions" usually consist in the rapid bobbing of the head up and down or backward and forward. The disease is probably closely allied to epilepsy, and like epileptiform

seizures of the more ordinary kind, these nodding fits are probably at times due to the presence of tubercles in the brain.

The curious spasms of the fingers and toes, or of the wrist and feet, known as "tetany," may be regarded as almost special to children, although they occur in others also, especially in nursing women. Occasionally a graver or more continuous form, resembling tetanus more closely, may occur in childhood. Slighter forms, again, of these "carpo-pedal" spasms are often detected as manifestations of partial convulsions or as the precursors or remnants of general eclampsia. In connection with wasting diarrhea, a chronic spasm of these parts is often associated with the swollen state of the backs of the hands and feet, due, apparently, to anæmia. In such cases, the nervous affections may pass off as the general state improves, without any generalization of the spasms.

Hysteria is by no means precluded from our diagnosis by early age. It may occur even in young boys.

Of mental disorders, idiocy and imbecility are the most important in childhood. These defects cover a multitude of special ailments, such as inability to speak, to walk, etc. Violent maniacal fits after epileptic attacks, or replacing them, it may be, are likewise well known in children. A certain passionate violence in children sometimes goes to such a length as to suggest hysterical mania or some other instability of the mental faculties. In some cases, similar attacks are connected with uric-acid diathesis.

In this connection, but short of any serious mental aberration, may be classed the terrible "nightmare, or night terror," of young children, arising from the vividness of their imaginations, coming on during night, probably in connection with dreams. Somnambulism also in various forms and degrees occurs in children, or excessive talking in bed when asleep, or it may be with the eyes open. In this condition the child may be able to answer, in a kind of way, various questions directed to it. These conditions of sleep-walking and sleep-talking are often dependent on, or at least aggravated by, undue application to study or continuous anxiety in connection with the studies.

Headaches in children will be discussed in a special chapter.

PULMONARY AND CARDIAC SYMPTOMS.

One of the most striking symptoms in disorders of the respiratory system in childhood, consists in the appearance of rapid or labored breathing, with excited action of the alæ of the nose, so that when we see this, with heat of the skin, we can scarcely go wrong in alleging a respiratory disease or complication. Another very striking feature of respiratory distress in children at the breast, consists in their giving over sucking or in their readily abandoning the attempt, although, perhaps, eager to try. They have not breath enough to suck the breast, and may even be unable to suck the bottle, although

this is a less taxing effort in such condition. When this inability is reported, we always think of pneumonia or severe bronchitis.

We have already referred to violent efforts at inspiration occurring in croup; but the presence of stridor in respiration, with a curious hoarse or squeaking sound, and the hoarse, yet clinging sound in the cough, with, at times, a similar hourseness in the voice, constitute points of equal importance in the diagnosis.. Some of these croupy attacks, although alarming to look at, are practically devoid of danger; the affection being only an attack of catarrhal laryngitis aggravated by spasms. In cases with deposits in the larynx or trachea, on the other hand, the danger is always great. The alarming dyspnœa in such children is more constant, never quite relaxing even for a moment, although in them the element of spasms is clearly present, aggravating the permanent obstruction. The throat should always be examined for diphtheritic patches; but there is often laryngeal diphtheria without any of the affections of the fauces.

Occasionally retropharyngeal abscess gives rise to symptoms somewhat similar to croup, and so the case may be misunderstood. Spasms of the glottis from nervous causes or from foreign bodies in the windpipe may also do so.

Sometimes very rapidly-increasing pleural effusion, especially in a scarlatinal nephritis, may produce the most powerful efforts at respiration, resembling the paroxysms of asthma rather than croup. The sniffling noises in the nose with the respiration, from congenital syphilis, constitutes a well-known sign of much importance.

In children, the absence of sputum of the respiratory organs is habitual. In chronic pulmonary phthisis with excavation—usually in children over five—we may, however, have the well-known nummular and globular sputa. Even cough is often absent or obscured in many cases. A peculiar squeaky cough is heard sometimes in bed, from pleuritic accumulations threatening suffocation. In empyema, children sometimes spit up the pus from the pleura with a favorable result. The aspect of children as regards lividity and flushing has already been mentioned. The decubitus, or lying-down position, is similar to that in an adult, and has similar variations, or is even more varied, from the restlessness of youth. In bad pleural effusions the child lies on the affected side.

The rhythm of the breathing is sometimes very irregular in children. Irregular or sighing respiration is frequent in cerebral affections, especially in meningitis. This is usually characterized by a few slow, shallow breaths, almost imperceptible, followed by a deep respiration. At times the implication of the breathing is a terminal phase of a case of cerebral tumor, the breathing stopping while the pulse is good; it may be even possible to re-establish the breathing for a time by artificial means. A certain slowness of respiration is very common in cerebral cases. Occasionally this altered rhythm becomes "regular in its irregularity," the ascending and descending

series of respiration, with a period of apnœa, described as "Cheyne-Stokes' respiration," being perfectly marked in cases with gross cerebral lesions; but this same irregular respiration may occur in cases not primarily of a cerebral nature, and it is frequent in grave cases of enteric fever with cerebral symptoms. The writer has seen the perfect Cheyne-Stokes' respiration in an infant overwhelmed with the poison of scarlet fever.

The irregular breathing of opium narcosis, perhaps from an overdose of medicine, must likewise be mentioned. It resembles the cerebral breathing just referred to, but is more characterized by intermissions in the breathing than by irregularity or by any definitely altered rhythm.

In chorea we often see a very marked irregularity in the breathing, both when the child is lying quietly and when it is trying to speak or swallow, the management of breathing, as regards to time, being so far out of control as to prove troublesome in these actions. In rickets we have often a very great increase in the rate of respiration, so that it may run up to fifty or sixty in a minute, and this not only in connection with catarrh and slight pneumonic attack, but apparently as the normal condition of the rickety child's respiration.

In auscultation and percussion, we have the same general facts as in adults. Clinking percussion and the "bruit skodique" are relatively common in childhood during advancing and receding pneumonias and pleurisies, and the greatest care must be observed. Beware of making a diagnosis of cavity from the "cracked-pot sound" in the case of an infant, unless supported by other strong evidence.

Phthisical disease of the lungs is much more common in early life than it was formerly supposed to be. We must not suspect, however, the same great liability of the very apex of the lung to be involved as in adults. This and the implication of both sides in the consolidation help to make the diagnosis more difficult, and we have to rely much on the general aspect, the course of the case, and the family history.

Bronchial phthisis is often suspected in the case of children with a suspicious appearance and history of phthisis, when auscultation gives but little signs of pulmonary softening. We may have tubular breathing between the scapulæ; dulness or percussion there and at the upper part of the sternum; and perhaps loud fits of coughing, with almost a crowing respiration, resembling pertussis. Occasionally, in such cases, cheesy, fetid masses are expectorated.

Bronchitis is seldom difficult of recognition, from the presence of wheezing, snoring, or moist rales, or of all kinds mixed up together. The very high-pitched, wheezing sounds suggest, of course, the finest tubules as indicated.

Pneumonia is, however, very difficult of recognition. In the lobar form, this arises from the physical signs frequently being late in appearing, so that although the disease may be suspected and care-

ful watch kept on the chest, day after day may pass without physical signs, and thus the violent fever, delirium, and other forms of nervous excitement may lead to the suspicion of cerebral inflammation, especially if the child passes into a kind of comatose state. The physician, now thrown off his guard, may have given over the exploration of the chest at the very time physical signs could be made out; and when hope is almost given up, in view of meningitis, we may see the child recovering, and perhaps a troublesome cough coming on for the first time. The clue to the case is often found in the very violence of the fever, and of the symptoms generally, at the outset; for with the ordinary meningitis, pronounced cerebral symptoms usually coincide with comparatively moderate fever.

Cerebral excitement from pneumonia has been supposed specially common when the disease affects the upper lobe. In such cases, the pneumonia is of the lober or croupous form. It is of special importance to recall this situation of the disease, as experience in the adult leads us to search for pneumonia as rather at the base. In children the localization of the disease in the upper lobe has not quite the gravity in indicating a tubercular origin, as in the adult.

In broncho-pneumonia, which may also simulate cerebral affections, the lobules are involved in the catarrhal process, and so the physical signs vary much in distinctness. If extensive, we have dulness, tubular breathing, etc., as plain as in the other form; but if the condensed patches are small and scattered, the physical evidence of their presence may be obscure, and the signs of fluctuating, one day pretty clear, another day scarcely recognizable. One day we may think the right lower back is the site of the disease, the next day we may think the dulness and alteration in breathing is in the left. One day the whole side may seem implicated, another, only the base. The auscultatory signs vary much. Often we have tubular breathing more or less marked. Sometimes there is rather feebleness of the breath sounds. If either of these changes coincides with distinctly appreciable relative dulness in the back, however slight, fine, moist rales, rapid or labored breathing, excited action of the nostrils, and high temperature, we may put the case down as pneumonia in some form. Having done so, we do not readily change our opinion, although the physical signs may seem to become less amidst the persistent fever.

Judging from the signs just enumerated, we may think a broncho-pneumonia impending, or already begun, when the sequel shows that whooping-cough is the real disease; but the local conditions in the lungs are probably closely allied to the other condition if much fever exists. Even in the course of a moderate case of whooping-cough, the signs referred to may all be present, and may almost completely disappear for a time after a fit of coughing, with or without vomiting.

In childhood, collapse of the lungs plays an important part in the changes brought about in bronchitis and catarrhal pneumonia; but patches of collapse, sometimes of large extent, may occur without

much concurrent inflammation, especially in whooping-cough. The signs are dulness on percussion, feeble respiration, partial immobility of the affected side, and by and by there may be a falling of the ribs, either permanently or only for a time.

With regard to special auscultatory signs in childhood, the same harsh inspiration is natural to children. The occurrence of tubular "puerile breathing" will recall the fact that a very full and somewhat breathing in pleuritic effusion, especially at the back, instead of the feeble or suppressed respiration not often looked for, seems to be relatively more frequent in children than in adults, so that we are apt to make a diagnosis of consolidation of the lung when there is really a pretty large effusion in the pleural cavity.

In pleurisy we may frequently miss in the child the initial friction sound; indeed, the diagnosis at this age has usually to be made on the ground of pain in the side with restriction of the breathing without any audible friction. In a day or so we may have our diagnosis confirmed by the presence of dulness on percussion, at the base behind, with feeble respiration and diminished vocal resonance. With the subsidence of the effusion we may have the friction audible for the first time.

In cardiac diagnosis we have the same phenomena as in adults. Affections of the heart in children are very much more common than was formerly supposed. We must remember the occasional occurrence of congenital malformations with signs of stenosis of the pulmonary artery and other indications of defective development. There may or may not be concurrent cyanosis. We may practically exclude aneurismal disease from our diagnosis of cardiacal diseases, although dilatation of this kind has been seen at this age. With regard to pericarditis, we may, of course, have it in acute rheumatism; in case of chorea, also, with or without distinctly rheumatic symptoms, pericarditis may supervene, always a most grave complication in this disease. In young subjects the tubercular form of pericarditis is relatively more common than in adults.

With the extension of pleuritic inflammation so as to give rise to pleuro-pericardial friction of genuine pericarditis, we are often in doubt as to whether there may not be a tubercular basis for the extensively distributed mischief. The course of the case alone can decide. The pericarditis of Bright's disease must also be remembered.

A very special variety of pericarditis may be said to be limited to young subjects, essentially of pyæmic origin, but developed in connection with "acute phlegmonous periostitis." This usually involves the tibia, but other long bones may suffer also. In such cases pericarditis seems to mark the constitutional affection. It may persist for a long time, or it may be rapidly fatal. With the pericarditis we have often endocarditis also, and the disease in the valves giving rise to further dangers and complications, such as pyæmic emboli in the kidneys, etc.

In children, perhaps, even more than in adults, rheumatic pericarditis may suddenly become highly dangerous from the excessive effusion, but the sign is not peculiar at this age.

DIGESTIVE SYSTEM.

The disorders in the digestive system are full of peculiarities in children, and especially in infants; but just on this account, we may deal with them slightly in this chapter, for in connection with weaning, artificial-food diarrhea, etc., the reader will find all the matters of special importance enlarged on elsewhere. The undigested milk and curdy motions; the aspect of the fæces, when, as sometimes, they are green when passed, or sometimes only become green when exposed to the air; the influence of feeding in determining a motion, so that, as the nurses say, "the milk seems to run through the child at once;" the dreadful smell of the motions at times, and the controlling influence, in this respect, of boiling the milk; the tenacity of the curd as vomited by the infant—the importance of these and of many other such matters has to be learned, and they can be sought for in another chapter.

The significance of vomiting, and especially of persistent vomiting, in the child, has even a wider range—wide as that that pertains to disease of the digestive system itself. Vomiting is extremely common at the beginning of the acute fevers; and if carefully inquired for, it will be found that it is very usually present at the onset of scarlatina. Even with pneumonia it is very common, and with various other serious febrile illnesses. It is, however, as the index of meningitis or other cerebral affections that it is most anxiously considered by physicians when called to a case of persistent or very frequent vomiting. Again and again we try to explain it away as due to some digestive derangement, to the use of purgatives, or to the want of them, to errors in diet or in management, and the like, but we are forced to admit that these explanations are untenable, and that we are dealing with the vomiting of incipient brain-disease. At other times we may have the greatest anxiety as to the significance of such vomiting, till the whole disturbance subsides without further mischief. From this it will be gathered that we know of no special points by which cerebral can be discriminated from vomiting of other origin. We aim at discovering if the vomiting had any obvious cause in the diet of the child, or if the tongue and state of bowels point to disorders there. We try to make out if the vomiting was preceded by a feeling of nausea for some time before it occurred; for it is when the vomiting seems most "causeless," in these respects, that we suspect a cerebral cause. We further attach great importance to the concurrence of severe headache with the vomiting and even to the concurrence of headache with any special turn of vomiting. The state of the temperature will also guide; for if suddenly rising

very high, we rather think of some impending fever, the elevation being, as a rule, very moderate in tubercular meningitis. The state of the bowels may guide us; for if there is concurrent diarrhea, the chances for meningitis are very small, since this disease is usually attended with constipation, and further, the looseness points to digestive disorders likely of themselves to cause vomiting. If constipation is present, this, in meningitis, can usually be overcome after a little trouble, by physic; but if it be intractable, both constipation and vomiting may be due to intestinal obstruction of some kind. The state of the abdomen may guide; for if obstruction exists, some distention is usually present, but in meningitis there is no distention, and, indeed, in the course of the case we may even have retraction. Very often we can only wait, holding possibilities in view and trying to steer a course, as regards treatment, which will be as free as possible from objection, whatever the eventualities may be.

Intestinal obstruction has just been referred to as a cause of vomiting. While all forms may occur in childhood, we must remember that intussusception is relatively common in infants and children, and the presence in the intestinal discharge of blood, the discovery of a tumor in the abdomen, or an examination of the rectum by the finger, may clear up the cases which were doubtful till such assistance was obtained. Another cause of intestinal obstruction in childhood which is apt to give rise to mistakes and confusion, from the rarity of such accidents in adults, is the presence of tubercular peritonitis. Of course it is well enough known that in this condition there may be troublesome constipation; but at times we have, apparently from the agglutination of adjacent coils of the intestines, a distinctly mechanical obstruction produced, revealing itself not only by general abdominal distention, but also by violent peristalis of the coils of the bowel above the obstruction; this being visible through the abdominal wall, as in many cases of abdominal stricture of the intestines.

An examination of the mouth reveals at times disorders so common in childhood as almost to be called peculiar; viz., stomactitis in its various forms. We may have little blisters, with clear fluid, on the tongue and mucous membrane of the mouth, or the spots may be rather like little superficial ulcers. In either case the salivation may be extreme, and there is often great fetor of the breath, and the whole digestive system is deranged. Another form of stomatitis is the gangrenous (*noma cancrum oris*), in which the edges of the mouth on one side become black. The disease may also involve the gums, the teeth falling out, and great destruction of the parts often results. This destructive disease usually follows measles or some general, or at any rate, occurs in connection with some great constitutional, depression. A similar gangrenous disease may attack the vulva in little girls. Another form of stomatitis is the parasitic, formerly, and even now, spoken of as aphthous; its popular name is "thrush." In this we see white patches on the tongue, on the inner side of the cheek, or on the

throat. It is specially prone to occur in infants reared artificially, and assumes its greatest intensity in such when they are reduced to the last stages of wasting. Under the microscope, the thallus and spores of the *Oidium allicans* may be recognized. At times it presents, when on the fauces, a certain resemblance to diphtheria.

The examination of the throat has greater importance in children, because we can not always be guided by them to the seat of their pain. A tonsillitis may at once explain the existence of a violent febrile disturbance; or with a suspicious scarlet rash the appearance of the throat may at once enable us to declare scarlatina. In other cases, the presence of the white patches of diphtheria may explain otherwise unintelligible illness.

The discrimination of the various forms of sore throat is far from easy; often, indeed, it is impossible. Redness with patches of exudation, so-called ulcers, on the tonsils, coincident with high temperature and a uniform scarlet rash, we must always regard as scarlatina; but when the rash is measly rather than of uniform scarlet color; when the throat is a little red but not very red, and quite destitute of patches, and when the rash is very bright and abundant, and the temperature only slightly elevated, we get into great difficulties. Sometimes the so-called German measles (*rothelin, epidemic roseola*) may be the cause of the symptoms. At other times, with slight rashes and no sore throat, we may be in the presence of a trifling erythema, or perhaps of a rash due to some special surgical dressing, or to some internal remedies which are being used.

Tonsillitis with patches may occur without any connection with scarlatina, but it may also precede, but only for a day, the appearance of the scarlet rash. We may, however, miss the rash if very evanescent, or if search had not been made in time for it. Probably scarlet fever may affect the child and its throat without any rash appearing at all; and also a sore throat may appear as a local manifestation of the poison, particularly in those already protected by an attack, without the whole system being contaminated by the contagion.

Similar difficulties beset the diagnosis of diphtheria. When well marked, nothing is more easily recognized; thus we may have the white membranous exudation on the uvula, palate, and tonsils, with regurgitation of the fluids through the nose, moderately high fever, and albuminous urine. But in case of one or two insignificant white spots, like follicular tonsillitis, we may subsequently find, either in some case or in another member of the family, that the trivial-looking illness was the fatal diphtheria. All such cases should be treated with care, and all should be labelled as more or less infectious, although it is not necessary to declare the existence of diphtheria openly till the symptoms or the sequel make it certain.

Itching at the nose and anus, and grinding of the teeth in sleep, have been regarded, with justice, as evidence of gastro-intestinal irritation. The first, indeed, has acquired a reputation as diagnostic of

intestinal worms, especially when combined with pallor and wasting, notwithstanding a good appetite. It is certain that picking the nose is very common in a multitude of cases where no worms appear. Itching and scratching at the anus, if quite pronounced, are very suggestive of "seat-worms" (*Oxyurides vermicularis*); but even then delay should be had till, after a purgative or an enema, the little worms are actually seen.

The "round worms" passed by children, or sometimes vomited by them, seem often to be expelled rather because of the child's illness from some other cause, than to be themselves the cause of the acute attack. Sometimes they lodge in enormous numbers in the intestines of unhealthy children. Tapeworms infest even quite young children, occasionally. Here, too, segments of the worm must be seen to warrant a diagnosis.

Toward the beginning of this chapter there are warning words against teething being regarded as a cause of disease; but these remarks do not warrant any neglect in ascertaining the actual state of the dentition, a subject to be fully discussed in another chapter. In connection with the physical examination of the child, some remarks have already been made in the present chapter on peritoneal effusions and on glandular diseases in the abdomen.

GENITO-URINARY SYSTEM.

Disorders in the genito-urinary system present fewer points calling for notice than in the cases of the physiological system.

The occurrence of renal affections after scarlatina is in this connection one of the most important considerations, and general dropsy or albuminaria in the young should always make us think of this, although, apart from any fever, parenchymatous nephritis is specially prone to affect young subjects. The other forms of Bright's disease likewise occur in children; contracted kidney occasionally, and amaloid kidney frequently. In grave cases, it is always well to examine the urine for albumin and sugar, and by the microscope. To do this it will often be necessary to have recourse to the catheter, if a sample can not otherwise be obtained.

Gravel in the urine probably accounts for many painful attacks, with screaming; but it is only when we can recognize that the pain is with micturition, or when we see the uric-acid crystals soon after water is passed, that we may be able to make the diagnosis. Occasionally, there is no doubt, renal colics are quite unrecognizable in our young patients, although the urine, if charged with uric acid, or if mixed with blood, may guide the treatment. When the stone is in the bladder, painful micturition, with blood, especially at the end of the act, or the occasional stoppage of the stream, or the presence of pus or mucus in the urine, may help the diagnosis; but this can be made certain only by sounding the bladder. Vesical calculus in children is almost always limited to males.

Pyelitis occurs in childhood. It may arise from a calculus, but probably is caused more often by scrofulous deposits in the pelvis of the kidney. The diagnosis is to be made as in the case of adults.

Hydronephrosis occurs in children, and may indeed be congenital. The presence of a tumor, and its variations in size, with great alterations in quantities of urine passed, may guide the examination. Cancer or sarcoma of the kidney often attains to an enormous size in children, with great swelling of the superficial veins, and the most extreme wasting.

Diabetes, both in the saccharine and in the insipid form, is found in childhood. The saccharine variety is at times clearly traceable as an heredity affliction. The diagnosis is made as in the case of adults; but in childhood the prognosis of diabetes mellitus is the worst possible.

Polyuria from granular and amyloid kidney must be remembered in making the diagnosis of diabetes insipidus.

Urinary sediments in childhood, apart from pus blood, casts, and epithelium, usually consist of urates, or uric acid. Both deposits are oftener much paler than in adults, and white urates, sometimes with hedgehog crystals, are frequently responsible for the milky urine so often described by mothers and nurses. Occasionally, of course, the milkiness may be due to pus. Uric-acid gravel is comparatively common in childhood. Oxalates are often seen, likewise, in the sediment. Occasionally systine is found in the urine of children, sometimes with, and sometimes without, the occurrence of calculus. Cystinuria, although really rare, may be found in several members of the same family. Cholestrin in the urine is very rare.

Wetting the bed at night (*anuresis mycturia*) may be regarded as essentially an affection of childhood. It will be discussed elsewhere, but it is mentioned here more especially because the passing of water in bed may be the only available sign of an epileptic fit occurring during the night.

Disorders of the sexual organs need not detain us. The precocious development of them in childhood has already been mentioned.

The irritation of a phimosis or its influence in determining masturbation or enuresis is oftener a matter for inquiry, or for surgical operation, which was especially mentioned in the introductory.

In girls the occurrence of vulvitis and of purulent discharges from the genital passages may at times raise very difficult and disagreeable questions. These have also been mentioned in the introduction, but will be discussed in a separate chapter.

CHAPTER XV.

MATERNAL IMPRESSIONS.

From time immemorial there has been a popular belief that impressions made upon the mind of a pregnant woman would cause defects in the child with which she was pregnant at the time.

In the well-known instance related in Holy Writ, there seems to have been no expectation on Jacob's part that the Almighty would interfere directly to cause the flocks of Laban to bring forth young "ring-streaked, speckled, and spotted;" but the device that Jacob resorted to is mentioned in such a way as to show a belief at that time in maternal impressions.

It was only comparatively recently, as the present age of skepticism approached, and thinking men came to doubt the truth of those things which they could not understand, that the power of these maternal impressions began to be questioned. Whether maternal impressions bear a causative relation to fœtal defects, is one question; how such impressions act in producing the defect is another ,and a totally different question.

In this article we will review some of the evidence upon which the theory of "maternal impressions" rests, and see what grounds there are for the popular belief which is so common to all nations, and kindreds, and people.

We will omit all "hearsay" testimony, and will endeavor to take into consideration only that which we have from reliable sources.

Much confusion exists also as to the nature of the defects attributable to maternal impressions, as well as to the nature of the impressions themselves. It is, therefore, important that the subject should be systematically studied before any definite conclusions can be reached.

There are two classes of defects which have been attributed to maternal impressions,—mental defects, and bodily defects. They should be considered separately.

Mental defects in the child may be due to violent emotional disturbance of the mother during her pregnancy. This is generally acknowledged by those who have given most attention to the subject; and yet the cases of this character which have been recorded are few in number. History and tradition, it is true, furnish a number of instances of the kind.

Sir Walter Scott, for instance, mentions that James I could not stand the sight of a drawn sword; and a gallant gentleman who was knighted by James makes the same statement, and acknowledges afterward that he was apprehensive at the time lest the king should let the

sword fall upon his shoulders, with the wrong side down. The monarch's apprehension was attributed to the fact that prior to his birth, his mother had seen Rizzio cut down in her presence.

Dr. E. Seguin, well known as an authority on the subject of mental affections, stated that it was a well-known fact that an officer of the first Napoleon, as to whose courage there could be no question, became pale when he saw a naked parlor sword. The explanation was that his father, in a fit of jealousy, had nearly killed his mother with such a weapon during her pregnancy with Napoleon's future officer.

Dr. Seguin reported at the same time another case which came under his own observation and care. A girl, who at the time that he knew her was twelve or thirteen years old, was a congenital idiot. The other members of the family, which was a large one, were above the average in point of intelligence. The mother was pregnant with this idiotic child during the civil war of Paris, and was harassed with anxiety for the safety of her husband.

The well-known statement of Baron Larrey with respect to the siege of London, in 1793, is most striking, and yet it is by no means certain that the results were attributable solely to the fear and distress of the women, for the privation and suffering also were extreme. Of ninety-two children born in the district soon afterward, sixteen died at birth; thirty-three died within ten months; eight became idiotic, or rather, it should have been stated, perhaps, were idiotic; and two were born with several bones broken.

So far as we are able to judge from the limited data at hand, it would appear that a prolonged impression is far more liable to influence the fœtus than a short one, even though the latter may be more violent. It is especially difficult to reach any conclusion on this point, however, because in many instances a sudden and violent shock was followed by a long period of distress.

The *character* of the impression is of great importance. *Anxiety* and *grief* seem to hold the first place, and fear the second, with respect to the frequency with which maternal impressions influence the mental characteristics of the child. So far as we can learn, no case of sudden or excessive joy has produced any appreciable effect.

The data are also insufficient to establish the *period* of *pregnancy* at which maternal impressions are most liable to cause mental defects in the child; and additional difficulty is placed in our way here by the circumstance that the impressions are usually prolonged. It would seem most probable that the mind of the child would be most readily affected in the later months of pregnancy. "The permanent cerebral convolutions are formed from the seventh month onward." (Landois.)

Bodily Defects.—Far more cases of bodily than of mental defect have been attributed to maternal impressions, and the reason for this is obvious. The bodily defects are apparent at the birth of the child; the mental defects are obvious only at a later period, when the child's mind should have undergone development, and by that time the various

causes of anxiety or mental distress during pregnancy have probably been forgotten.

As has been mentioned heretofore, the doctrine of maternal impressions, so far as the production of bodily *defects* are concerned, has met with vigorous opposition. Some of those who have been the most strenuous in their opposition have, however, acknowledged that malformations may be caused by physical impressions, such as "unaccustomed agitation and fright." (Foerster.)[1]

Rockistansky, whose vast experience and sound judgment give weight to all his statements, says: "The question whether mental emotions do influence the development of the embryo, must be answered in the affirmative. Instances undoubtedly have occurred of such maternal impressions—fright more particularly, when violent—giving rise to malformations."[2]

He goes on to state that it is just conceivable that the connection may be accidental. He refers, also, to a fact with which all anatomists are familiar, that anomalies of the vascular system are more common than those of any other part of the body; but the heart and blood-vessels are so far shut in from direct observation that the influence of maternal impressions in the production of these anomalies has scarcely been noticed. Peacock, alone of all the writers on the subject, calls attention to the probable connection between impressions made upon the pregnant woman, and congenital defects of the heart.

"One of the strongest evidences against maternal impressions on the child in utero, in the opinion of the opponents of the doctrine at least, is that all deformities are due to errors of development. Now there are two difficulties in the way of this objection. It presupposes that all defects which have been attributed to maternal impressions were 'errors of development,' or deformities in the common acceptance of the term, which is not the case. We shall see that in a considerable proportion of the cases which have been reported by reliable physicians, there was no error of development, but a mark or marks which evidently occurred late in pregnancy, when the development of the child was practically complete. But the fact that in a very large proportion—a large majority indeed—of the cases the defects were plainly due to errors in development, does not in the least militate against the doctrine of maternal impression, provided it can be shown that the impression was made at a period of pregnancy when the development of the deformed part of the body was not complete. It is not a question as to how maternal impressions produce deformities, but whether they *actually* do produce them.

"The whole subject has to be considered from a number of different points before any definite conclusions can be reached; and it will be well to state before proceeding further what those different points are. They are as follows:—

1 "Die Missbildungen des Menchen," p. 4, vol. 1.

2 "Pathological Anatomy," vol. 7., p. 11.

"1. The period of pregnancy at which the impression was made. This is important in order to determine whether the impression was made at a time when an error in development was possible.

"2. The similarity of the defect in the child to the object making the impression upon the mother.

"3. Whether or not it is necessary for the woman to be conscious of the impression, for the defect to result.

"4. The value of a statement of the character of the impression made before the birth of the child, and the proportion of cases in which such antepartum statements have been made.

"5. The channels by which the impressions have been received by the mother.

"6. The duration of the impression necessary to produce the effect.

"7. The character of the impressions which are most liable to produce results.

"8. A brief consideration of the objections which have been urged against the doctrine of maternal impressions.

"9. The practical deductions to be drawn from a consideration of the subject."

For convenience we shall tabulate a few out of the ninety cases reported in Keating's "Cyclopedia of Diseases of Children," which is considered worthy of credence.

The table will show: (1) The name of the reporter; (2) the journal or work in which the report may be found; (3) the period of pregnancy at which the impression was made; (4) the cause or nature of the impression; and (5) the nature of the defect in the child.

1. Brydon. *British Medical Journal,* July 17, 1886. Period of pregnancy, two months. Mother stated before knowing the nature of the defect, that she had seen a picture of a child without a neck. The child had no neck.

2. A. M. Brown. *British Medical Journal,* February 20, 1886. Period not stated. The mother had her ears pierced, and was much disturbed afterward for fear of effect on the child. Child born with holes in the lobules of the ears.

3. T. Graham. *British Medical Journal,* March 6, 1886. Period not stated. The mother was frightened by a rat. Three fingers of right hand webbed; nails like claws.

4. Brydon. *British Medical Journal,* April 3, 1886. Mother dreamed her big toe was bitten off by a rat. Child born with one toe missing.

5. Barrett. *British Medical Journal,* April 10, 1886. Period from time of marriage. The milkman, whom the mother saw daily, had one finger amputated. Child had only four fingers on one hand.

6. Addenbrooke. *British Medical Journal,* May 13, 1871. Period five or six months. Woman saw her mother suddenly stricken

with paralysis on one side. Child born with facial paralysis on one side.

7. Bolton. *St. Louis Medical and Surgical Journal,* October, 1881. Period four months. Woman saw an albino at a circus. Child born with a patch of white hair on its head.

8. Bolton. *St. Louis Medical and Surgical Journal,* October, 1881. Period three months. Mother saw a man with a harelip, and was much impressed (previous child normal). Child had harelip.

9. Bolton. *St. Louis Medical and Surgical Journal,* October, 1881. Period three months. Young opossum thrown in woman's lap; she was much startled. No expectation of defect. Child had ears like an opossum.

10. Fairbrother. *St. Louis Medical and Surgical Journal,* August, 1881. Period three months. Mother saw a man with two fingers of right hand amputated. Child had only three fingers on the right hand.

11. Furnam. *St. Louis Medical and Surgical Journal,* May 5, 1880. Period two or three months. Mother frightened by a jackass. Child had head and ears like a jackass.

12. Furnam. *St. Louis Medical and Surgical Journal,* May 5, 1880. Period two months. Mother saw a terrapin killed; was greatly shocked. Child had claws like a terrapin.

13. Trenholme (quoted by Furnam). *St. Louis Medical and Surgical Journal,* May 5, 1880. Period not stated. Mother saw a man with both legs amputated; was greatly impressed. Child born with both legs absent.

14. Maughs. *St. Louis Medical and Surgical Journal,* December, 1882. Period four months. Woman dreamed her child would be hermaphrodite; so informed her husband at the time. Child was hermaphrodite; form of sexual defect not mentioned.

15. Scott. *St. Louis Medical and Surgical Journal,* December, 1882. Period two months. Mother frightened by the sight of the frog-faced woman. Child like the frog-faced woman.

16. Atkinson. *Philadelphia Medical Times,* August 8, 1874. Period not stated. Mother frightened by lightning, and grasped the left arm just below the elbow. Left arm ended with rudimentary fingers just below the elbow.

17. W. T. Taylor. *Philadelphia Medical Times,* February 11, 1882. Woman visited her mother, who had cancer between the eyes; was greatly distressed. Child born with large nævus between the eyes.

18. D. W. Prentiss. *Philadelphia Medical Times.* Early period. Woman saw friend with large nævus on the face; mother slapped herself on right buttock, and said if child was marked, it would be there. Child born with large nævus on right buttock.

19. W. T. Taylor. *Philadelphia Medical Times,* November 25, 1876. During pregnancy, mother saw beggar with fingers of one hand missing; greatly impressed. Child had no fingers on the right hand.

20. W. T. Taylor. *Philadelphia Medical Times,* November 25, 1876. Early period. Mother looked with "unaccountable delight" on her father-in-law's bald head. Child had a bald spot on its head.

21. Hammond. *Quarterly Journal Psychological Medicine,* January, 1868. Period two months. Woman saw her husband with a severe wound in his face; greatly shocked. Scar on face, corresponding in site to father's injury.

22. Doty. *Medical and Surgical Reporter,* July 2, 1881. Four months. Woman attacked by a ram and greatly alarmed. Long head covered with black wool, which extended down the back of the neck and on the arms; large round eyes; two large front incisor teeth; cry, bleating.

23. Heywood Smith. *Medical and Surgical Reporter,* May, 1881. Three months. Mother frightened by monkey. Girl with a face singularly like a monkey's.

24. W. L. Allee. *Philadelphia Medical Times,* August 8, 1874. Early period. Mother saw a man with a harelip. Child harelipped.

25. Wright. *American Journal Obstetrics,* January 8, 1878. Seven weeks. Mother visited brother, in jail for serious crime. Saw prisoner brought in with manacles on hands and feet. Greatly shocked and impressed. Child born at five months; harelip; fibrous cord connecting one hand with the other, and similar cord connecting the feet.

26. Storer. *American Journal Medical Science.* Beginning. Saw a hen's leg knocked off with a stone. Greatly excited about it. One foot missing.

27. Adams. *American Journal Medical Science.* Not stated. Woman dressed stump of amputated arm for her brother. One arm absent.

28. Rawlings. *Medical and Surgical Reporter.* Beginning. Woman impressed by sight of a man with one leg. Leg missing from the middle of the thigh.

29. B. Johnston. *British Medical Journal,* March 28, 1885. Woman saw the "two-headed nightingale," and fainted at the sight. Child united from neck to hip in front.

30. Wilson. *Obstetric Journal of Great Britain,* June 15, 1880. Last few days of pregnancy. Woman received burns upon her hands. Child born with fresh-looking blebs upon its hand, corresponding in position to the mother's burns.

31. Brayton Ball. *Gynaecological Transactions,* 1886. Two or three months. Woman saw a child with a large protruding tongue; impression strong. Child had a large protruding tongue from its mouth.

32. Purefoy. *Medical and Surgical Reporter,* May 31, 1881. Woman attempted to raise by hand a calf, of which the right ear, right eye, and both forelegs were absent. Child had no right ear, no right eye, orbit indicated by slight depression; arm and forearm on right side absent, but there was an abortive hand attached to the scapula.

Roth quotes Meckel with respect to bodily defects brought about by maternal impressions, to the effect that "it is impossible that such casual connection could exist later than the first month of intra-uterine life." And Roth himself, who is a pronounced believer in the power of maternal impressions, says the time they are most probably effective is during the first three months of pregnancy, or more exactly, from the second to the third month; the plates come closer to each other, so that a separation at that time would scarcely be possible.

With respect to special forms of deformity or defective development, which we are considering just now,—harelip and cleft palate,—we are told by embryologists that the superior maxillary process of the first branchial arch come together during the first eight or ten weeks of fœtal life, and at the ninth week or soon afterward, the hard palate is closed, and on it rests the septum of the nose.

The table shows that in the main the maternal impressions which produced, or which were supposed to have produced, these deformities, occurred at this very period.

A woman seven months pregnant went to the door to answer a knock; she was shocked to see a man who could not speak, and from whose windpipe projected a tracheotomy-tube. Two months afterward the child was born with a tracheal cyst, and fistulous opening leading into it. It seems scarcely possible that there could have been any connections between the impressions and the defects in this instance, on account of the evident error of development to which the defect was due, and the late stage of pregnancy at which the impression was made.

Is it necessary for the mother to be conscious of an impression, and to expect a defect, for such a result to ensue? It is a singular fact, about which there can be no doubt, that it is not necessary for a mother to *expect* a defect in the child for such a defect to occur, whether this defect be mental or bodily. For example, in the case reported by Purefoy, the woman does not seem to have expected that her child would present defects similar to those of the calf which she attempted to rear by hand, and which was, of course, so often before her eyes and in her thoughts.

Of what value is a statement made by the mother before the child is born, as to the impressions, and the character of the defect which she anticipates? In not a few instances the mother has stated before the birth of the child what the impressions were, and what she believed would be the nature of the defect in the child. For example, in Daley's case: A woman during the first three months of her pregnancy lived in a house which was infested with rats; she was greatly annoyed by them, and at the birth of the child, before she knew of any defect, she asked if it was like a rat. The child had no neck and no face, but a long snout projecting from between the shoulders and in a line with the body. In two cases, also, and where the impression was due to a dream, the nature of the impression was closely and distinctly stated, months before the birth of the child, and in each instance the defects corre-

sponded thereto in a most remarkable manner. Evidence of this sort should be carefully weighed before acceptance, unless the defect corresponds very closely with the impression; for it is a fact that many women expect defects in their children, and often have very definite conceptions as to what those defects will be, and yet at birth the children are normally developed in all respects, and are free from any "marks" whatever.

THROUGH WHAT CHANNELS ARE IMPRESSIONS MADE UPON THE MOTHER?

The channel through which impressions are usually received by the mother is that of sight; but it is difficult to say how much is due to the simple sight of the object, and how much to the emotional disturbance caused by viewing it. It is very probable that the latter is really the effective cause; for in some instances the effect has been caused in other ways, and yet the result has been the same. For example, in three cases the impression was caused by a dream. In another case a woman had her hand violently pressed by her husband's elbow, the pain being so great that she finally fainted. In this case the impression was evidently caused by violent pain.

WHAT DURATION OF THE IMPRESSION IS NECESSARY TO PRODUCE A RESULT?

There seems to be no definite rule on this point, nor is it by any means easy to arrive at a conclusion with regard to it.

In a number of cases the shock was sudden; but the mental impression resulting therefrom was far more enduring, and it is impossible to say whether the defect would have resulted if there had been nothing to induce it but the sudden and fleeting shock.

WHAT CHARACTER OF IMPRESSION IS MOST LIABLE TO PRODUCE DEFECTS?

In the vast majority of cases the impression is due to some emotional disturbance, and in nearly all the cases included in the table the emotion was of an unpleasant character. *Fright* and mental impression resulting therefrom, would seem to be by far the most common of all causes. Physical suffering must have caused it in two cases. It was pity, doubtless, that led the woman to attempt to rear a deformed calf by hand, resulting in the marking of her child.

"Unaccountable delight" may be the cause, as in the case of the woman looking at the bald head of her father-in-law during her pregnancy. It is singular, in view of the frequency with which defects are attributed by the general public to "maternal longings" for certain articles of diet, that so few cases of this character should have been reported by physicians.

Abnormalities may occur without fright.

Deformities generally occur before pregnancy is certain, or before

the mother is conscious that she is pregnant, as in case mentioned of the milkman having one finger amputated.

Abnormalities may occur in animals. Furman has reported a case in point, which occurred in Anderson, Kentucky. There passed through the town a menagerie, with which was an elephant; a sow pregnant a short time saw this elephant, and one of her pigs, born some time afterward, had skin, *trunk,* and ears similar to those of an elephant. He states that a similar case had occurred in Shawneetown, Illinois. Now, unless we deny the facts, the conviction that the relationship in these cases is that of cause and effect, seems almost irresistible.

Several children of the same parents often present bodily abnormalities. The writer knows a family who inherited harelip for three generations. Grandfather, father, and son were born harelipped.

The fact that fright and emotional disturbances of other kinds are common in pregnant women, and deformities comparatively rare, is not a just ground for unbelief in the power of maternal impressions. It would be as unreasonable to say that scarlet fever is never conveyed by milk, because but few cases of the kind have been reported, as to say that maternal impressions never cause deformities, because such a connection can rarely be established. The fact that scarlet fever is sometimes conveyed in milk was well established long before the nature of the disease was definitely understood, and it was not rejected because no explanation could be given; and shall the fact that impressions sometimes produce deformities be rejected because we can not understand how they act?

There remains, finally, the practical part of this whole subject yet to be considered. It is advisable that a woman should be guarded from strong emotional disturbances of every kind during her pregnancy, for fear of the effect upon her unborn child. With the light before us, there can, I think, be but one answer to this question. Few as are the instances, relatively speaking, in which deformities are traceable to maternal impressions, they are yet sufficiently numerous, and sufficiently distressing, to necessitate care on the part of every pregnant woman; and I can not but think that it is the duty of every physician to warn his pregnant patients of the necessity for avoiding powerful emotions of every kind, and especially those which are of a distressing character.

With the facts before us, the following conclusions with regard to "maternal impressions" seem to me to be warranted:—

1. Impressions made upon a pregnant woman are capable of causing mental and bodily defects in her child.

2. Neither mental nor bodily defects are often, comparatively speaking, attributed to mental impressions.

3. The defects attributable to mental impressions may be either errors of development or "marks," which are apparently due to circulatory or inflammatory disturbances.

4. The defects due to errors of development have, as a rule, been attributed to impressions made at a period of pregnancy when such errors of development are known to occur.

5. The other defects (marks, etc.) have, as a rule, been attributed to impressions made at a later stage of pregnancy, when circulatory and inflammatory disturbances would be most reasonably expected.

6. In a very large proportion of the cases, there is a striking similarity between the object causing the impression and the defects in the child.

7. It is not necessary for the woman to be *conscious* of the impression, or to *expect* a defect, for such a defect to occur.

8. In a very considerable proportion of cases, the woman has stated the nature of the impression, and of the anticipated defect, before the birth of the child.

9. The impressions are generally due to emotional disturbances which are nearly always of an unpleasant character, but physical pain is capable of producing impressions which may induce defects.

10. An impression of considerable violence may produce an impression in a short time, even a few hours, but, as a general rule, the duration is probably much longer than this.

11. Maternal impressions are capable of producing defects in the lower animals.

12. Defects traceable to maternal impressions are sufficiently numerous and sufficiently serious in character to necessitate the avoidance by any pregnant woman of all violent disturbances, especially those of an unpleasant character.

I will give a short sketch of the most important pathological conditions affecting fœtal life.

The various conditions that unfavorably influence the fœtus in utero will be considered sufficiently for the women to have a clear understanding of this very important subject.

The catalogue of fœtal diseases referable to maternal influences is a long one. Nervous disturbances, high temperature, defective nutrition, disease of the womb and of its adnexa and lining membranes, alteration in the blood pressure, the presence in the blood of soluble poisons, or that subtle influence which we call heredity,—any of these may be accountable for disease or fœtal death.

THE INFLUENCE UPON THE FOETUS OF NERVOUS DISTURBANCE IN THE MOTHER.

We will quote from Barton Cooke Hirst, M. D.: —

"No one has demonstrated a direct nervous connection between mother and fœtus, yet no one will deny the remarkable sympathy between the two. Mental peculiarities, acquired, perhaps, only during pregnancy, are not rarely stamped indelibly upon the fœtus. The mother of Jesse Pomeroy, the well-known moral monstrosity, of New

England, took delight, while carrying this child in utero, in watching her husband, a butcher, ply his trade. The boy's irresistible inclination to torture and slay may well have had its origin in its mother's perverted taste during her pregnancy. But more wonderful still is the occurrence of physical defects or peculiarities in the fœtus, photographic reproduction of objects that have produced a strong impression upon the mother during pregnancy. I had occasion once to administer many hypodermic injections to a woman in the early months of gestation, producing in several instances small abscesses which left conspicuous scars. The child was born with spots upon it identical in appearance and situation with those upon its mother's arm. Still more extraordinary examples of maternal impressions have been seen by others. The fatal effect, in some instances, upon the fœtus, of strong emotions in the mother, have seemed to me explicable in the light of recent discoveries as to the formation of leucomaines and ptomaines. Perhaps the powerful nervous disturbance acts upon the blood like an electrical current upon a chemical solution, altering its composition. It would be difficult to explain by this theory, however, cases of congenital idiocy which may be traced to emotions of fear, anger, or disgust during pregnancy. I have been recently told of a remarkable case of this kind. A lady was obliged to pass the night with an intoxicated bridegroom; conception occurred, and the child became an idiot. Three subsequent children were also mentally defective, although there was no taint of insanity on either side of the house. The impression of deep disgust experienced at the first conception exerted an influence on the development of the subsequent children. A great fright during pregnancy, if it does not kill the child outright, may much diminish its mental capacity. Down[1] says that he can refer to a number of cases of feeble-mindedness which were the outcome of the siege of Lucknow, and the same author refers to an incident of the siege of London (1795). In addition to a violent cannonading, the arsenal blew up with a terrific explosion, which few could hear with unshaken nerves. Of ninety-two children born in that district within a few months afterward, eight become idiots. We must frankly admit that an explanation of susceptibility displayed by the fœtus to violent impressions upon the maternal nervous system, is beyond our power; we are obliged, notwithstanding, to allow that the fact is as well established as any in medicine."

[1] "Mental Affections of Childhood and Youth," London, 1887.

CHAPTER XVI

DISEASES OF THE FOETUS.

DEFECTIVE NUTRITION.

Defective nutrition in the mother, with its consequent anæmia, either is fatal to the fœtus in utero, or else is accountable for the birth of puny, wretched children, who die early or drag through a sickly childhood. The causes of the maternal malnutrition are many. Among the more serious are chronic diseases, as cancer, phthisis, malaria, nephritis;[1] chronic poisoning, as by lead or tobacco ; inability to retain food, as in the vomiting of pregnancy; inability to obtain food, as during siege and famine. The "enfants du siege" of Paris were for some time distinguishable from the children born before and after them. The treatment of fœtal ill health from maternal anæmia is, of course, to improve the mother's impoverished blood; remove the cause of the trouble, if possible; administer iron; and prescribe moderate exercise in the open air, with perhaps change of climate, and the birth of a vigorous infant can sometimes be secured, which will perhaps contrast strongly with its predecessors, which were not treated in utero.

DISEASES OF THE ENDOMETRIUM, THE WOMB, AND ITS ADNEXA.

These need only be mentioned here, for their most frequent effect is the premature expulsion of the ovum. We have known, however, a great inflammatory thickening of the endometrium to exist throughout pregnancy, with the result, apparently, of diverting nutriment to itself which should have gone to the child, which was born a feeble creature, and lived only a short time.

POISON: THE MATERNAL BLOOD.

Any soluble substance absorbed into the maternal circulation may pass from mother to fœtus, such as chloroform, ether, salicylate of sodium, benzoate of sodium, strychnine, morphine, quinine, corrosive sublimate, iodide of potassium, urea, the bile salts, soluble salts of lead,—these are all said to affect the fœtus in overdoses. Bile salts are said to be the most pernicious in their action upon fœtal health and life.

[1] E. Cohn stated at a meeting of the Berlin Obstetrical Society that eighty-six per cent of the children from mothers with nephritis, would be born still or too feeble to survive long.

HEREDITY.

The fœtus in utero may acquire from its mother certain tendencies to disease, which may be manifested only in after life. The most remarkable example of this is found in the transmission of hæmophilia, through a female to her male offspring. A young woman with a violent attack of chorea in pregnancy, told her physician that her mother had been affected with the same disease while pregnant with herself. Nothing is more familiar in nature than the transmission of physical, mental, and moral peculiarities from parent to child; and this fact must be taken into account by all clinicians. The question as a whole, however, is too large for consideration here, and it must be passed by with the brief mention it has received.

DISEASES OF THE FOETUS REFERABLE TO ABNORMAL CONDITIONS OF THE FATHER.

"It sometimes happens that the spermatic particle, while capable of fertilizing the ovum, is unfit to perform its share in the work of building up a healthy, well-developed fœtus. If the father is too young or too old, the subject of some debilitating disease, a victim of poisoning, or a drunkard, his fertilizing element may produce an embryo that will die before maturity, or else be born at term a defective, unsound infant. As saturnism in the mother is disastrous to the fœtus, so also a man saturated with lead seems almost incapable of procreating healthy children. Of thirty-nine pregnancies in women whose husbands were sufferers from chronic lead poison, eleven ended in abortion, there was one still-birth, and only nine of the children survived early infancy.[1] Men afflicted with nephritis, diabetes,[2] phthisis,[3] or cancer, have been found, in some instances, unable to produce a fœtus capable of normal growth, while their widows, subsequently married, have borne healthy children. Drunkenness in the father is not infrequently a cause of ill-development in the fœtus. Matthew Dunkan[4] has called attention recently to the evil influence upon the fœtus of intoxication in parents."

SYPHILIS.

Definition.—(Etiology uncertain.) Vulgarly called "pox." The true venereal disease is syphilis. The term "secondary" is applied to syphilis after the morbific matter has been absorbed and diffused through the system. The secondary symptoms are ulcers in the throat, blotches on the skin, pain in the bones, etc.

Syphilis as a disease of fœtal life is put in a separate section chiefly on account of its great importance and relative frequency. It is

[1] Paul, loc. cit.

[2] Priestly, Lumleian Lectures on Intra-uterine Death, London, 1887.

[3] D'Outrepont, Neue Zeitschr. f Geburst., 1838, Bd. VI, S. 34.

[4] Edin. *Medical Journal*, April, 1888.

separated from the other infectious diseases because its manner of invading the embryo and fœtus is peculiar. Ruge estimates that eighty-three per cent of premature births and still-births may be traced to syphilis in one or both of the parents. (Zeitschr. f. Geburst., Bd. 1.)

If a woman is syphilitic, every ovum within the ovary is diseased, and if fertilized will contaminate the resulting embryo. On the other hand, each fertilizing element from a man with this disease, carries within itself the seed of the disorder, to infect the ovum which receives it, although the maternal organism, as a whole, may remain unaffected. Again, if the syphilitic poison is introduced into the body of a pregnant woman previously healthy, the disease may be transmitted to the fœtus in utero. This doctrine of modes in which an embryo may become tainted with syphilis has not yet met with general acceptance, although it can be supported by the strongest proofs. No one, of course, now denies the fact that a woman infected before or at the time of insemination will probably produce syphilitic offspring. That the disease can be transmitted to the fœtus in utero, or that the ovum alone can be infected while the mother remains, for a time at least, free from the disease, are statements not so universally admitted. A prominent authority in this country says, in a recent edition of his work on obstetrics: "The syphilitic poison will not traverse the septa intervening between the fœtal and maternal vascular system." Neuman,[1] however, has seen this very thing occur in five out of twenty women who were infected with syphilis during pregnancy. In the Maternite at Bordeaux,[2] of twelve women who were infected with syphilis in the first four months of pregnancy, all gave birth to dead children. In those cases in which infection occurred from the fourth to the sixth month, about half the children were still-born, and in seven cases of infection during the last three months there were four still-births. A woman in the Philadelphia hospital who acquired a chancre in the third month of pregnancy, gave birth to a child, still-born, which had on it unmistakable evidence of syphilis. This can not excite much surprise, for it becomes every day more clear that syphilitic poison is "a particulate and living virus,"[3] and we shall presently offer ample evidence to prove that disease-breeding germs can pass from mother to fœtus.

Modern authorities—Tarnier, Echroeder, Charpentier, Priestly, and many others—assert their positive belief in the transmission of syphilitic virus to the ovum directly from a diseased man, without the previous infection of the woman. As the fœtus grows, however, and the syphilitic poison develops with its growth, the mother sometimes becomes infected, in her turn, directly from the fœtus, through the utero-placental septum.[4]

[1]Wien Med. Presse, XXIX, 1885.

[2]Hirigoyen, abstract in New York *Medical Record*, April 12, 1887.

[3]J. Hutchinson, *British Medical Journal*, 1886, I, 279.

[4]See Tarnier, et Budin, op. cit.; Priestly, loc. cit. J. Hutchinson, *British Medical Journal*, 1886, I, 239; Harvey, Fœtus in Utero, 1886.

DIAGNOSIS OF FOETAL SYPHILIS.

The infection of the fœtus may be inferred with reasonable certainty if either parent had acquired syphilis at a date not too remote from the procreation. There is no doubt but that the probability of syphilitic persons bearing diseased children, somewhat diminishes as the time wears on; but the limit of safety has not been discovered. Lomer tells of the production of a syphilitic infant ten years after the infection of the father, and Kassowitz records a latent syphilis of twelve years' duration. If active treatment has been pursued, however, four years should serve to eliminate the poison. If a woman should acquire a chance during pregnancy, the possibility of the disease attacking the fœtus is occasionally found in those cases in which the ovum is infected by the spematic particle. The woman may remain perfectly healthy till the middle of pregnancy, when signs of secondary syphilis may appear, without the slightest trace anywhere of a primary sore. In such cases the poison of the disease has been transmitted from fœtus to mother. Very often the signs of fœtal syphilis can be looked for only in the fœtus itself, after its expulsion from the uterus, and much may depend upon a correct diagnosis. This is, however, not always easy to reach. The parent's history, from ignorance or design, may be entirely negative. The child may be born with no distinctive sign upon its body. If it is living, however, the coryza and characteristic eruptions during the first few weeks usually point clearly enough to the hereditary taint. If the child is dead, the diagnosis can be more easily made, unless maceration has proceeded very far; even then, however, there is one sign that may be regarded as quite distinctive.

In these cases of fœtal death it is important to ascertain the cause of the misfortune, in order to prevent its occurrence in subsequent pregnancies. The bulbous eruptions on the skin, the condylomata and inflammation of the mucous membrane, the inflammation of the serous membranes, the gummatous and miliary deposits, and the morbid growths of connective tissue in the brain, lungs, pancreas, kidneys, liver, and spleen, and the coats of the intestines, and walls of the blood-vessels, along with a characteristic osteochondritis, should demonstrate the character of the disease. Wagner was the first to call attention to a curious condition of the dividing line between diaphysis and epiphysis of the long bones of a syphilitic infant. Instead of a sharp, regular, delicate line formed by the immediate apposition of cartilaginous to bony tissue, as in a healthy fœtus, there may be seen in syphilitic cases a jagged, rather broad line of a yellow color separating bone from cartilage. A microscopic study of this portion of the bone shows that there has been a premature attempt at ossification, which has ended in fatty degeneration. Since Wagner first called attention to this important point in diagnosis, we have looked for this sign in every case of

unmistakable syphilis that occurred in the Philadelphia and Maternity Hospital, and never failed to find it, while in doubtful cases it proved a valuable aid to a correct diagnosis.

Zweifel thus describes the progress of the disease: "There is formed, in a certain region of the cartilage, granular tissue, insufficiently supplied with blood-vessels, and ill nourished. There results necrosis of this tissue, with an attempt at exfoliation, and an accompanying suppuration." According to Roge,[1] the liver of a healthy infant should constitute about one-thirteenth part of the body weight. In syphilitic infants, however, this proportion is much exceeded, the liver forming in extreme cases one-eighth of the total body weight. The spleen, too, is much enlarged in syphilis. This organ, which in a normal fœtus at term should be in weight one-three-hundredth part of the whole body, often much exceeds its due proportion. Upon these three signs, the yellow line between epiphysis and diaphysis, the increased weight of the liver, and the increased weight of the spleen, which are all easily discovered, the diagnosis of syphilis may rest with reasonable certainty.

Prognosis.—The chances for a syphilitic embryo reaching a healthy maturity are very slim. Charpentier found, in an analysis of six hundred and fifty-seven cases, that more than one-third of the pregnancies in syphilitic women ended in abortion, while a large proportion of the children born at term were dead. Add to this low vitality of syphilitic infants, the high mortality among them, and it will be found that, fortunately for the race, hereditary syphilis is not so common as one might expect, if it is looked for in children of more than a year's growth.

Treatment.—Treatment of fœtal syphilis is best begun before the embryo is called into existence, by eradicating the disease from the parents. If only one is affected, treat that one. In case of doubt, both man and woman should be put on a long course of anti-syphilitic remedies. The direct treatment of the embryo or fœtus, after conception, while not so satisfactory, should not be neglected, if there is reason to believe it syphilitic.

Both mercury in its soluble salts and iodide of potassium will pass into the fœtal circulation, and may modify or entirely prevent the morbid processes characteristic of the disease. In most cases the placenta will be diseased, and the affected area for oxygenating the fœtal blood much diminished; and in such cases, potassium chlorate does good, and has been recommended by Simpson, Barker, Penrose, and others, although it may be doubted if the explanation formerly offered would account for its favorable action, that is, that it increased the oxygenating power of the maternal blood.

Infectious Diseases.—These affections are produced by the entrance into the body, and the development there, of some low form of life. This has been conclusively proven of many infectious diseases; of the rest it may be surely inferred, although the exact nature of the

[1] Loc. cit.

materies morbi has in some instances not yet been demonstrated. The only medium of communication with the outer world possible to the fœtus is the maternal blood.

Variola.—The occurrence of variola in utero has long been a fact beyond dispute. The fœtus, however, is not always affected, even though the mother has the disease badly; on the other hand, the mother may transmit the disease to the child in her womb, although she remains healthy; or a light attack of varioloid in the mother may be associated with virulent smallpox in the fœtus.[1] Again, it has been noted that of twins one or both may be affected.

Rubeola.—The transmission of measles from mother to fœtus is a rare occurrence, but is not unknown. Thomas collected six cases for medical literature.

Scarlatina.—There are a few well-authenticated cases with an unmistakable scarlatinous rash upon them, accompanied by fever, and followed by desquamation and albuminuria. Those reported by Leale[2] and Saffin[3] are quite typical.

Erysipelas.—Kaltenbach, Runge, and Stratz have reported cases that were in all probability erysipelas in utero.

Malaria.—Many practitioners have reported cases of periodic exacerbation of temperature in the new-born, apparently due to malaria acquired during intra-uterine life. We had a case recently in which the temperature rose, in a new-born infant, on two successive afternoons to 103 degrees Fahrenheit, the fever being preceded by great uneasiness. Quinine administered to the mother in large doses promptly cured the child.

Tuberculosis.—It is said, curiously enough, the transmission of tuberculosis to the fœtus in utero is an exceedingly rare occurrence.

Septicaemia.—The possibility of the transmission of septic micro-organisms from mother to fœtus has been denied by many, and strongly affirmed by Konbassoff, Chambrelent, Pyle, Mars, Von Holst, and others.

Cholera.—It is doubtful whether it affects the fœtus, nevertheless early abortion is the rule; or, if the child is born alive, it survives only a few days. (Queirel.)

Typhoid Fever.—The most serious effect of typhoid fever upon the fœtus in pregnancy is usually a premature expulsion of the ovum. This occus in sixty-five per cent of the cases.[4] It would seem, however, that the disease can directly attack the fœtus.

Articular Rheumatism.—Cases are reported of articular rheu-

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[1]See Tarnier et Budin, op cit; Wolf, Virch. Arch., Bd. cr.

[2]*Medical News*, 1884, p. 636.

[3]*New York Med. Recovd*, April 24, 1886.

[4]*Berlin Klin*, Worchenschr., 1886, S. 389.

matism affecting the fœtus. Pocock[1] and Schaffer[2] each describe such a case. In both instances a woman gave birth to a child presenting, in one case at once, and in the other at the end of three days, unmistakable signs of the same articular rheumatic disease.

Yellow Fever.—Dr. Bemiss,[3] of New Orleans, says, "The pregnant woman being attacked by yellow fever, and recovering without miscarriage, immunity from further attacks is conferred upon the offspring contained in the womb during the attack." If this is true, it certainly seems that the fœtus, too, must have been infected by the disease.

Pneumonia.—Cases of pneumonia are reported not infrequently.

Rachitis.[4]—Intra-uterine rachitis is not common, but there is abundant evidence to prove that the disease may occur in utero. It is thought most likely the nutrition of the mother is at fault; and not only improper or insufficient food, but also other unfavorable conditions of life, as cold, dampness, lack of light and ventilation, play a part in the production of fœtal rachitis. In the more advanced degrees of the affection an inspection of the product of conception after its expulsion from the womb, can leave no doubt as to the true condition. A stunted growth, heavy joints, limbs bent in curves or angles, and abnormally short, a distended belly with a "pigeon-breast," the large, square head with gaping sutures and fontanels, and bowed spine, all point unmistakably to this curious disease of the bones. The diagnosis of the disease in the fœtus during pregnancy is, of course, impossible; therefore, no treatment will be attempted.

Anasarca.—This disease of the fœtus usually determines its premature expulsion, most often between the fourth and eighth months, and the infant, even though it reaches a viable period, is commonly born dead. Fœtal anasarca has been attributed to dropsy in the mother, syphilis, and to obstruction of the umbilical vein. The serous infiltration of the skin is often accompanied by collections of fluid in the abdominal and pleural cavities, and the placenta is often œdematous.

Spontaneous Fracture in Utero.—A syphilitic osteochondritis results not uncommonly in a separation of epiphysis and diaphysis in the long bones, simulating fracture. Advanced rachitis in the fœtus is undoubtedly the commonest cause of intra-uterine fracture occurring independently of violence during pregnancy and labor.

LUXATION AND ANCHYLOSIS.

These affections of the joints in fœtal life are not common. Dislocations have been found more frequently in females than in males,

[1] *London Lancet*, 1882, Vol. II, p. 804.

[2] *Berlin Klin*, Worchenschr., 1886, S. 79.

[3] See Heinrich Braun Arch. f. Klin. Chirurg., Bd. XXXIV, S. 668.

[4] See Tarnier et Budin, op. cit., p. 255; Schorlaw, Monatschr f. (Gebuttsh., Bd. XXX, S. 401).

and are more commonly seen in the lower than in the upper extremities. If in a breech presentation the presenting part is detained for a long time in the pelvic canal, there may be an apparent anchylosis of the hip and knee-joints for some time after birth, the limbs rigidly retaining the position they occupied during labor.

PERFORATION OF THE INTESTINES.

Paltauf[1] has reported five cases of deaths in the first few hours after birth, due to perforation of the large intestines and escape of meconium into the peritoneal cavity.

FOETAL TRAUMATISM.

In spite of a position which secures for it the greatest possible immunity from external violence, the fœtus has been seriously and fatally injured. Gunshot, stab, or other perforating wounds of the abdomen in pregnant women, falls from a height, blows, and kicks, or a crushing force upon the mother's abdomen, have killed the child within her womb. The damage done the fœtus by this indirect violence is manifold.

DISEASES OF THE FOETAL APPENDAGES WHICH REACT INJURIOUSLY OR FATALLY UPON THE FOETUS ITSELF.

The fœtus is essentially a parasite, depending for its well-being upon the health of its host and the normal condition of the tissues that put it into communication with its source of oxygen and nourishment,—the maternal blood. Disease, therefore, of the placenta, cord, and membranes must exert a malign influence upon the health and growth, or even the life, of the product of conception. Degenerations of the placental villi; apoplexies of the maternal capillary loops that surround the villi in early intra-uterine life; thrombosis of the blood, which moves in sluggish current through the maternal lacunæ; retro-placental effusions, which separate a certain portion of the placenta from the uterine wall; syphilitic overgrowth of the placental decidua, which crowds in upon the inter-villous blood spaces, must all abrogate the vital functions of the placenta to a greater or less degree, with the result either of destroying the fœtus outright, or else half starving and strangling it, and thus producing at term a puny, wretchedly-developed infant. Even should the placenta be in a perfect condition to perform its part in the formation of the fœtus, the umbilical cord may fail to convey the blood to and from the fœtal body in a natural manner. The circulation in it may be obstructed by knots, although these by no means cut off the blood current. The cord may be compressed in other ways, wound tightly about some portion of the child's body, or caught between the child's limbs. The caliber of the vessels may be diminished, also, by disease of their walls, by the great growth of connective tissue encircling both arteries and veins, that is commonly seen in syphilis; or the

[1] Virch. Arch., Bd. CXI, S. 461.

vessels may be almost occluded by a cellular infiltration of the cord substance, which is also, to my mind, a valuable sign of syphilis. The fœtal circulation may be disturbed, if not entirely suspended, by hemorrhage from the vessels in the cord. The escape of blood, however, into the cord substance is necessarily limited by the narrow area in which it is confined; but in contrast to this is the bleeding that may follow rupture of the large branches of the umbilical vein spread out under the amnion on the fœtal surface of the placenta.

Cystic degeneration of the chorion, too, almost always involves the destruction of the embryo or fœtus; yet cases have been reported of healthy, well-developed infants born at term, with rather extensive cystic disease of the chorion villi. Abnormalities of the amniotic secretion have a very decided influence upon the growth and well-being of the fœtus.

The amniotic fluids play an important part in the growth of the fœtus, by distending the uterine cavity, allowing room for the free play of fœtal movements, and preventing injurious pressure of the uterine walls; therefore, an insufficient quantity of fluid will prove a disadvantage to the fœtus.

(The care of the child at and immediately after birth will be discussed in the article on "Maternity and the New-born Infant.")

CHAPTER XVII.

THE CARE OF THE CHILD AT BIRTH, IN ABNORMAL CONDITIONS.

We do not always find the child at birth in a healthy condition. It is not always plump and red, with a cry whose pitch and volume at once suggests the lungs of a youthful stentor. Sometimes the child is in a condition of debility; sometimes not only weak, but the victim of disease; sometimes apparently dead, and sometimes really dead—still-born.

The causes of these abnormal conditions are many and varied. They are the result of disease of the fœtus during gestation, or the result of accidents of gestation and parturition. "The product of conception evolves, during gestation, from a cell to a matured fœtus, and in this evolution, passes through changes and metamorphoses of the most extraordinary nature; and yet in healthy gestation, it accomplishes these changes and metamorphoses with a precision and exactness as mathematically accurate as the crystallization into well-known forms of a saline solution. Hence, it is evident that if the building material, out of which the future man is to be erected, be good, from it will be evolved a structure that will be correspondingly good. The evolution of a healthy, well-developed infant is, then, not a matter of chance or accident; but it takes place as the result of laws as unerring and as precise as the laws of crystallization." (B. C. Hirsh, M. D.)

Healthy men and healthy women, inheriting themselves good constitutions, and living healthy physical and moral lives, can not have any but healthy children. But, unfortunately, all men and women are not healthy; they have either inherited or acquired bad constitutions; and the inevitable consequence of it all is that when these imperfect men and imperfect women marry, if they have children, they must necessarily be more or less imperfect children.

The study of prenatal diseases shows all sorts of abnormal evolutions in the embryo and fœtus, and leads to a great variety of diseases, deformities, and monstrosities. They constantly cause the death of the product of conception during gestation, and hence, abortion, the great accident of gestation, is frequently due to them.

"Over the threshold of life is written the declaration of nature's righteous and inexorable law, 'The fittest shall survive;' and this law, so just, so stern, so merciless in its unpitying exaction, is *the* law which governs, not only life's beginning, but life's progress and life's end."

Man's intellect may enable him to elude the workings of this law for a time, but ultimately its majestic omnipotence triumphs; ultimately the fittest *alone* will survive.

Innumerable children die before birth, or at birth, not because our science or skill is valueless, but because nature's doom was pronounced at the moment of conception; and that wise and holy fiat by which alone a perfect race of men can be possible,—"The fittest shall survive," —that fiat proves their destruction.

Sometimes children are born dead, sometimes apparently dead, and sometimes in a condition of asthenia or debility.

DEBILITY IN THE NEW-BORN CHILD.

Asthenia, or debility in the child at birth, is easily recognized. The infant is pale, at times blue. Its features are shriveled. If it is the victim of prenatal disease, it is often more or less emaciated; though just born, it presents the appearance of age and decrepitude. The welcome music of the child's first cry in these cases is looked for in vain. We notice the convulsive gasps, or hear low moans, and perhaps the gurglings of air, as it is painfully and laboriously drawn through the mucous accumulations of the larynx and trachea. The child breathes imperfectly, either because it is too feeble to expand its lungs, or because, being a premature child, these organs are not sufficiently developed; hence its blood is not aerated; hence it is blue; hence it is cold; hence it can not cry.

In the treatment of the new-born child in such conditions, we must carefully bear in mind the possible causes of the asthenia.

Perhaps we are called upon most frequently to treat the debility in premature children, children born more or less before full time. We must be careful not to exhaust the feeble or fainting child by washing it, etc. A weak child might die if subjected to manipulations most desirable for a strong and healthy one. The child may be too weak to rub with lard and wash. If possible, however, it is best to grease and wash it. I have had cases where they were freely rubbed, but very gently, with olive-oil, and wiped clean; then a bit of lint saturated with olive-oil was laid in the armpit, and also a bit of oiled lint in the groins. The face and mouth were washed, but not the head. The infant was then rolled up in warm, clean, carded cotton wool, and then in hot flannel, and laid in a warm crib or cradle, with a warm bottle in the crib to keep the child warm. Special care should be taken in regard to overheating—in having the bottles too hot. The child should be thus oiled twice a day, never exposing it to a cold atmosphere while the process of oiling is going on. The naval cord should be kept oiled and enveloped in a soft cloth. After a day or two, if the child seems stronger, you may give it a bath, as follows: The water should be as hot as can be used, from 110 degrees to 120 degrees Fahrenheit, or as hot as the back of your hand will bear, is a fair test for a proper heat, as many people have not thermometers at hand. Some writers approve of using whisky and water baths. Use pure castile soap for cleansing the child.

There are three elements, each of which is essential to the proper management of these feeble children. These essentials are: The removal of all obstructions to respiration, a very high external temperature, and the use of nourishment and internal stimuli.

Obstructions to respiration in the mouth should be removed by wiping out the mouth. Those in the larynx and trachea are not so easily got rid of. An expedient at the time is to hold the child by the lower extremities, with its head down, and then shake it a little briskly, or spank it sharply on the nates; a sudden inspiration, followed by cough, may remove the whole trouble. Should such efforts fail, nothing is left but to wait in the hope, too often vain, that the child will ultimately acquire strength sufficient to take a full inspiration, and thus get rid of the obstruction.

The second essential is a very high external temperature. It must be remembered that these feeble children breathe more or less imperfectly; hence they do not inhale nearly enough oxygen to aerate the blood; thus they must be cold and weak. As such children can not make heat for themselves, it must be supplied from without. Should the child's temperature fall much below normal, it will certainly die. Many feeble children die from this cause alone, who, if treated properly, might live. Each case requires careful and constant attention and watching, in order that the temperature may be increased or diminished, as may seem to be necessary.

In many cases the temperature should be high. The body of the child should be kept at a temperature of not less than 98 degrees to 100 degrees Fahrenheit, and to secure this may demand the constant use of hot bottles and bags, etc.; so also radiated heat from a hot fire or from an open fireplace. The surrounding atmosphere should be very hot, but not too dry. There must be moisture in the room, that is, if the heat is from a stove. A kettle of boiling water on the stove will serve to keep up the moisture in the room. If an open fireplace is used, a teakettle placed close to the fire will serve the purpose. The surrounding atmosphere being kept hot in the above manner, with hot bottles in the crib, the warm blood passes through the lungs, and the internal as well as the external temperature will be maintained.

Cases are reported where a feeble, new-born child has been given up as dead, and left hopelessly in front of a very hot fire, and, after a very prolonged "toasting," it has been discovered to be alive, and has subsequently done well.

The third essential in these cases is the use of nourishment and internal stimuli. The child is too feeble to take nourishment by sucking, and it should be administered by a mop or a teaspoon. It should be given in small quantities, a few teaspoonfuls at a time, *very hot,* but not hot enough to burn, and should be given frequently. Give hot milk mixture, and hot water. Some writers recommend spirits diluted. The writer prefers the hot milk in place of hot diluted spirits, and has found hot diluted milk the most useful. I have found a tea-

spoonful of moderately strong black coffee with the hot milk to be stimulating enough. Formula, one heaping teaspoonful of pure coffee in a half teacup of boiling water; let it steep, not boil, on the back of a hot stove for ten minutes. This will serve the purpose of the whisky, and there is no risk from overstimulating the brain, as with whisky or brandy.

However, you may have to give hot whisky every ten to fifteen minutes. If so, dilute it one teaspoonful to six of water, sweeten, and give alternately with the hot milk, when the coffee seems not to agree when mixed with the milk. As soon as possible, the child is put to the mother's breast. We have had success in drawing milk from the mother's breast in a warm breast pump and feeding it to the child. By treating feeble children in this way, we often have the great satisfaction of saving lives otherwise doomed. The writer will add that to keep up the constant use of coffee is not approved of; as soon as the child is stronger, the coffee stimulus can be gradually removed. Nevertheless, in spite of all our efforts to save these cases, they often die. They gradually become colder and colder; their faces and hands bluer and bluer; their respiration more and more gasping and feeble, until it finally ceases. In such cases all treatment proves to be useless.

THE NEW-BORN CHILD APPARENTLY DEAD.

Children are born not merely in a condition of asthenia, but in a state of apparent death, which speedily becomes real death unless proper means are used to prevent it, and often in spite of all remedies. We find children born in this condition of apparent death presenting very different appearances. Sometimes the face and upper part of the body are red; sometimes they are marked with bluish spots, and swollen; the eyes are prominent and injected. Again, the child may be pale, and may exhibit marked evidence of profound prostration. Some writers speak of these varied appearances being produced by different lesions, as "apoplexy and syncope" of the new-born; others as the "congestive and simple asphyxia of the child;" others reject these terms as very imperfectly designating the pathological conditions they are meant to describe. It matters not by what name we call them, just so we can give the necessary treatment at the time, and save the child.

In the so-called apoplectic conditions, or the condition of congestive asphyxia, we find the surface swollen, the face red or bluish or spotted. The child lies apparently dead, makes no effort at inspiration, and makes no movement. The heart may or may not pulsate.

The causes which it is said may occasion these phenomena are either asphyxia or direct compression of the cervical vessels of the child.

Asphyxia produces them in the new-born child, just as asphyxia produces similar conditions in the breathing child or in the adult.

The blood is not aerated, congestion of the brain and lungs follows, and paralysis of the cerebral centers results. Anything occasioning asphyxia, either during labor or after delivery, may be considered as a cause of the apoplectic state of the child.

Compression of the cord during labor, twisting of the cord, premature separation of the placenta, etc., in other words, anything suspending the fœto-placental circulation before delivery, will produce asphyxia as surely as plugging up the larynx of the breathing animal will produce it. So, too, after birth, any cause suspending respiration, as mucus or any other material in the larynx or trachea, may occasion it.

The apoplectic condition may also be produced by any cause giving rise to direct compression of the cervical vessels. Hence, we meet it in face presentation, and in cases where the cord has been several times wrapped around the neck during labor.

The child's brain is engorged with blood. This engorgement has produced pressure on the cerebral centers, which has paralyzed their action. Hence, when the child is born, its brain fails to respond to the stimuli which nature has provided to arouse it to the performance of the great function of respiration. The cold air striking on the cold, wet surface of the child, ordinarily a most powerful stimulus to respiratory action, is now incapable of waking up the oppressed and congested and paralyzed medulla oblongata. If we can not awaken the action of the medulla, the custodian of life's functions, the child must inevitably die.

Bearing all this in mind, the treatment is evident. If the cerebral paralysis is the result of mere congestion, in most instances the child, properly treated, will recover. If the paralysis is due to effusion of blood into the substance, or on the surface of the brain, it will die. There are no symptoms to enable us to determine whether the cerebral paralysis is the result of engorgement, or the result of cerebral effusion, and therefore almost necessarily fatal; hence we treat all these cases alike.

Remembering that congestion of the brain is the curable cause of paralysis, we must remove it by bleeding the child; that is, we suffer to escape from the cord, one, two, or even three tablespoonfuls of blood. Should blood not flow from the cut cord, we may press and squeeze it from its insertion to the cut extremity. There is not much hope in the forlorn efforts of opening a vein.

While the blood is flowing from the cord, sometimes the blue color disappears; a rosy tint shows itself, first in the lips, then over the face, and finally over the body. The medulla acts, respiration is established, and the child is saved.

The next remedy is the very hot bath—a bath of a temperature from 105 degrees to 120 degrees Fahrenheit. This very hot bath acts as a powerful revulsive, tending to relieve the overloaded brain, and to equalize the circulation, while at the same time it is a power-

ful stimulus to the respiratory cerebral centre. After depletion, or without it, a basin of a bucket of hot water may be brought to the bed; and should the child not yet be separated from the placenta, because depletion from the cut cord has not been practised, the body of the infant may be plunged into the hot bath; after immersion for from a few seconds to a half minute, the body may be brought to the surface, and water as cold as can be obtained, may be dashed suddenly on the face and anterior surface of the thorax or chest wall. This expedient is a most powerful stimulus to respiratory action. The first contact of the cold water with the hot skin of the infant is frequently followed instantly by a sudden and full inspiration, and the treatment continued a few moments soon secures a satisfactory establishment of the respiratory process.

Should bleeding and the hot bath fail, there may be tried, as a hope, artificial respiration. Though the next condition calls for this treatment, which we will describe, yet it may be practised for the present one of apoplexy or congestive asphyxia.

There are several methods of artificial respiration practised on adults; but for the apparently dead-born child, I am confident there is but *one* way, and that is to blow directly into the lungs of the child. First blow directly into its mouth by placing your mouth to the mouth of the child; blow quick and hard. The air will force out any mucus that may be in the nose. Now press the nostrils together gently, to prevent the escape of the air from the nose; lean the head backward, or over the nurse's lap. The larynx must be pressed back against the anterior surface of the cervical vertebra to guard against the air entering the stomach. The practitioner, applying his or her mouth to the mouth of the child, blows directly into it. If a tube is at hand, it may be used, but the mouth is so much more expedient that it is to be preferred. As soon as the lungs are sufficiently inflated to depress the diaphragm and raise the walls of the thorax, the blowing is discontinued, and the thorax and abdomen are to be gently pressed, in imitation of expiration. The blowing is then to be resumed, and the mechanical expiration to be repeated, as long as it is thought desirable.

How long is it desirable to practise artificial respiration in this way on an asphyxiated child? This question is not easily answered. We shall reply to it by giving the history of a case. "The wife of a young physician was confined with her first child, under the care of a celebrated professor of obstetrics. The labor was complicated and tedious. The patient, during labor and after delivery, was in great peril, demanding the entire attention of her medical attendant. The child, when born, was apparently dead. The old professor said to the young doctor, father of the child (the mother was unconscious, and therefore did not hear): 'Doctor, cut the cord, and take the child away. It is dead, and your wife's condition claims my whole care.' The father separated the child, carried it into the next room, and placed it upon a bed. He then went back and again asked the pro-

fessor if he was sure the child was dead, receiving again a positive opinion that the child was dead, and that all attemps to revive it would be useless.

"The father returned to his dead baby, and, having nothing to do, in a wild, hysterical, utterly hopeless sort of way, began artificial respiration, after the manner I have described. Half an hour passed, with no results. The agonized father continued his efforts. An hour passed, but the infant seemed as hopelessly dead as it was before artificial respiration was attempted.

"The man's emotional paroxysm began to subside, and he began to realize that he was literally wasting his breath; still he did not desist. Suddenly he was startled by a slight, apparently spontaneous movement on the part of the child. With renewed energy he continued his labors, and in a short time normal respiration took place, and to his extreme felicity, the child was saved. This happened thirty-five years ago. The great professor is dead; the doctor, the child's father, is dead also; but the child, called back to life by the hysterical blowings of an agonized father, hopelessly practised for the very long period of perhaps an hour and a half, is now a grave, mature man, still living, and the comfort and solace of the mother who, that day, so nearly died in giving him birth." (Penrose, M. D., LL. D.)

Let this most interesting case answer the question, "How long shall artificial respiration be kept up in similar exigencies?"

Electricity and galvanism are said to be valuable agents for arousing the torpid nerve centers, and may, I have no doubt, in some cases prove efficient. They should be employed after other remedies have failed.

SYNCOPE OF THE NEW-BORN CHILD, OR THE CONDITION OF SIMPLE ASPHYXIA.

In simple asphyxia, or syncope, we do not notice the swollen and turgid face, etc., that characterizes the apoplectic condition that we have just studied. The child exhibits a mortal pallor, with all the evidences of profound debility. This syncope may be due to excessive debility of the child, or to some lesion of the cerebral centers; hence we meet with it when the infant is diseased or premature, or has lost blood during labor. The paralyzing pressure is from the *outside,* and not from the inside of the head; there is too little, not too much, blood in the child's brain. The treatment indicated in such cases is, first, preserve the connection between the child and the placenta as long as the latter performs its respiratory functions. Second, endeavor to arouse the paralyzed cerebral centers to work. Third, stimulate the feeble and fainting child, generally and locally. We do not bleed these syncoptic children. They have too little, not too much, blood. We call for a basin of very hot water—temperature 120 degrees to 140 degrees Fahrenheit, or as hot as you can bear the back of the hand in—

and while the child is yet attached to the placenta, it is plunged into the water up to its neck. The heat acts generally and locally as a powerful stimulant. Presently, as in the administration of the hot bath already described, the body is to be brought to the surface, and cold or iced water is to be dashed suddenly and forcibly on the face and the anterior surface of the thorax. This acts as the most powerful stimulant we have to arouse the benumbed cerebral centers to work. Keep up immersing the body in the hot water, and alternating these immersions with the dashing of cold water over the face and anterior surface of the thorax, as I have already directed, for some minutes. Often the first dash of cold water will cause an instant response. The child will give a spasmodic gasp, the lungs instantly fill, and the child's life is saved. If the child can swallow, it will be desirable, as soon as possible, to administer hot water and a little whisky every five or ten minutes, till the condition is relieved. (One teaspoonful of whisky in six teaspoonfuls of hot water, slightly sweetened.)

When all pulsation has ceased in the cord, and we realize that the placenta may be separated from the child, the subsequent treatment must be something like that which I have suggested as proper for the asthenic infant; that is, the removal of all obstructions to respiration, and active external and internal stimulation. These are the cases for artificial respiration, to be practised as I have already described, for high external and internal temperature, and for the use of the galvanic battery.

Children after tedious labors are sometimes born with their heads greatly compressed, and frequently much out of shape. It is not well to interfere in these cases. The proper treatment is to trust to nature, and not attempt to force or squeeze the head into shape. In a few days the natural elasticity of the structure will bring all the parts into harmonious relationship.

CHAPTER XVIII.

INJURIES OF THE NEW-BORN.

Injuries received by the child during or in connection with labor, are classified as external and internal, the latter, of course, being, as a rule, the more serious.

Injuries of the Head and Neck.—From the fact that in the vast majority of cases the cephalic pole of the fœtal ovoid descends the birth-canal first; that the propelling force of labor drives this passive mass against resistances, overcoming them, or, on the other hand, moulding that mass, modifying its form, and sometimes even its structures; and from the additional fact that in these cases of cephalic presentations, whether cranial or facial, the part is accessible to digital, manual, or instrumental means for facilitating delivery, it necessarily follows that injuries of the head during labor are much more frequent than those of any other part of the fœtus. The great majority are not serious. They are superficial, and in a few days usually disappear, either with or without the employment of very simple therapeutic means. Some, however, leave permanent disability, or even may be so grave that death results.

Caput-succedaneum (*"Asuccedaneous Head"*).—This is a term sometimes used for the tumefied scalp, which first presents in certain cases of labor.

Sero-sanguineous Infiltration.—This is common, but not a constant phenomenon; for if the labor be rapid, and the resistance slight, the child may be born without this swelling. Nevertheless, such cases are exceptional, and the occurrence of caput-succedaneum is so common that it might be regarded as a physiological condition.

This swelling may be round or oval, or in some cases, elongated, projecting almost like a pudding-shaped mass. In some cases it may be less than an inch in its longest diameter, supposing it to be oval, but in others two or three inches. The skin which covers it has changed in color, in consequence of the congestion. If the labor has been long, the surface of the tumor may be purplish or violet colored. So, too, in case of protracted parturition, the surface of the tumor may present phlyctenulæ, or inflamed condition, which, when ruptured, leaves the derm exposed.

In some instances, instead of there being simply an effusion of sero-sanguineous fluid in the connective tissues, rupture of blood-vessels has occurred, permitting hemorrhage, which, breaking this tissue, may be so considerable that a fluctuating tumor results. The rule is that the swellings do not occur as long as the membranes are ruptured;

but as observed by Tarnier, such rupture is not absolutely necessary. Schroeder and also Budin have met with tumors in some cases where the covering of the fœtus was not only intact but extensible.

The caput-succedaneum is usually formed during the dilatation of the os-uteri; but should there be subsequent delay in any part of the birth-canal—such delay being especially frequent at the vulvar orifice—a secondary caput is formed. If the pelvic inlet be narrowed, and the head pressed against the resisting bony ring by active uterine contractions, sero-sanguineous effusions soon occur, while the head remains above the superior strait. The seat of the caput-succedaneum indicates the position which the head occupied in a cranial presentation; also, it may be said, the position of the so-called caput-succedaneum in presentation of the pelvis and in that of the shoulder. The inappropriateness of the term is obvious; nevertheless the tumor designated by it has precisely the same origin, and the same essential character as in presentation of the vertex.

The swelling in presentation of the pelvis occupies the hip, which is the lower, and this is usually, though not always, the anterior. "If in some cases the swelling upon the pelvic region is uniform, this is explained either by the slight obliquity of the presenting part, or its early correction, the two hips descending equally. Here, as elsewhere, the skin is of a more or less dark blue, and the tumor formed by the sero-sanguineous effusion variable in prominence and extent." If the child be a male, the scrotum may become doubled in size and black. Instances in which sloughing occurred have been recorded.

In presentation of the shoulder, the sero-sanguineous tumor occupies the lower portion, but extends thence anteriorly or posteriorly upon the trunk, according as the latter may be inclined in front or behind. In case the elbow or hand descends first, then these become greatly swollen and discolored.

Treatment.—If the skin is broken and the swelling is great, or if the effusion is of blood instead of serum, an erysipelas may arise from the former, or even gangrene may ensue, and in the other case phlegmonous inflammation or suppuration may occur.

Following a facial presentation, the great swelling of the eyelids and the sub-conjunctival ecchymoses predispose to conjunctivitis. The lips and the tongue may be so swollen that the child can not nurse for several days, and it must therefore be fed. The broken surface resulting from ruptured phlyctenulæ or possibly from the rough use of the finger nails, may be dusted with iodoform, or with boracic acid or acetanilid. If the swelling is very great, compresses dipped in a solution of muriate of ammonia, or in a mixture of alcohol and water, or Pond's Extract may be applied. Should suppuration be threatened, warm fomentations and the application of a linseed poultice are indicated; while if the distinct formation of pus is recognized, opening the abscess and washing out the cavity with a warm antiseptic solution would be proper.

Kephalohaematoma, or Thrombus Neonatorum.—By this is meant a soft, fluctuating tumor of the scalp caused by effusion of blood between the periosteum and the bone. It is usually situated upon one of the parietals, upon the right more frequently than upon the left, in some cases upon both; it is rarely upon the frontal or occipital, or upon one of the temporals. The swelling, it is said, never transgresses a suture, though it may pass over and involve the adjoining bone, as in the case of Ducrest, in which the primary thrombus, occupying one of the parietals, passed over the intervening suture and under the other parietal. This tumor does not usually appear until from one to three days after birth; that is, when the caput-succedaneum is disappearing. It may be no larger than a pigeon's egg, or may have the size of a small apple. The skin-covering is not discolored, and thus a marked difference exists between this tumor and that previously described; it fluctuates, is not increased in size when the child is crying, and usually presents a distinct, bony margin around the base. Hemorrhage, either beneath or above the cranial aponeuroses, has been observed after the application of the forceps; but these are diffuse, have no bony margin defining their extent, and generally are rapidly absorbed. The swelling disappears in some instances in two or three weeks, but more frequently it remains for a month or more. Rarely suppuration occurs, and this is liable to be followed by caries of the bone. If there should also be an internal as well as an external effusion of blood, the child perishes with convulsions. The cause of the affection is by no means clear. Those who, like Earle, Godson, and Desroizilles, accept the opinion that it affects the portion of the head where it is found constricted by the os-uteri, can give no explanation for its occurrence in pelvic presentation, as has been the case in several instances.

Treatment.—Since absorption of the effused blood takes place in the great majority of cases spontaneously, and as the child does not suffer in anywise from the tumor, active interference is not usually indicated. By some the application of a solution of muriate of ammonia, of tincture of iodine, of mercurial ointment, or compression by means of collodion, or a thin plate of metal, is advised. Desroizilles remarks that these different applications appear to accelerate the disappearance of the tumor, and can not cause any irritation or other accidents, when prudently made. The employment of setons, or of punctures, is not advised; although should an abscess form, opening it is indicated, and it is possible, too, if the collection of blood remains for some time without change, that aspiration, all antiseptic precautions being used, would be beneficial without any evil results.

Wounds of the Scalp and of the Face.—Contused wounds of the face or of the scalp may be caused by the forceps, the accident depending upon the form of instrument, or upon the mode in which it is used.

The prophylaxis belongs to obstetrics, and therefore will not be considered here. Generally such wounds are quite superficial, and disappear in a few days. In their treatment, antiseptic powders, such

as boracic acid, iodoform, aristol, etc., or ointments, as oxide of zinc, boracic-acid ointment, or fomentations may be used. Punctured or incised wounds of the scalp have usually been caused by the obstetrician mistaking the caput-succedaneum for the bag of water. Antiseptic applications are indicated. More or less serious injury to the eyes has sometimes been done by the finger of the accoucher, in case of presentation of the face. Such injury, as well as that spontaneously resulting more especially to the eyelids in this presentation, do not require special directions as to treatment. In rare instances, dangerous and even fatal consequences have followed sloughing of the scalp. This accident has been observed from spontaneous labor, and also has followed delivery with the forceps, one of the blades causing such severe pressure that gangrenous inflammation was the result.

Facial Paralysis.—This accident, in most instances unilateral, has been followed by spontaneous delivery, but in the majority of cases it results from the use of the forceps, and is caused by pressure of one of the blades at the stylo-pastoid foramen, or a little in front of the lobe of the ear. The paralysis will not be observed when the infant is sleeping, but when awake and crying or attempting to nurse, it is quite apparent. It must be remembered that the complete absence of the mastoid apophysis, and the slight development of the auditory canal, favor compression of the facial nerve near its point of emergence. In some instances, only branches of the facial are compressed, and then the paralysis, instead of involving the entire half of the face, of course affects only the muscles to which these branches are distributed. In the majority of cases, recovery occurs spontaneously in from ten days to two weeks. In rare instances the paralysis becomes permanent, remaining unchanged, and therefore you can not make a positive statement as to recovery. It is generally advised not to employ any treatment until at least a month has passed without any improvement; then electricity may be used, the induction current being first employed; and if the muscles fail to respond, the continuous current may be used. The Faradic current should be applied by letting the current pass through the operator's hand. The anode, or positive pole, is held in the left hand of the operator, with his right fingers, moistened with warm water, placed over the affected part of the infant, and a flat negative electrode covered with several thicknesses of surgeon's lint, placed over the "nuche" of the neck; give the current gently from ten to fifteen minutes daily. The galvanic, if it has been resorted to, may be given by the same method, and ten milliamperes may be given for from ten to fifteen minutes daily, or every other day until the child recovers. It usually takes from six weeks to three months to effect a cure.

INJURIES TO THE BONES OF THE HEAD—DEPRESSIONS, FRACTURES, AND DISLOCATIONS.

Depressions and indentations of the cranial bones are most frequently seen when delivery has been effected by the forceps, but they have also been observed after spontaneous expulsion of the child.

Still more remarkable was the case reported by Matthew Duncan, in which a persistent impression was made by the finger of the accoucher, upon the right parietal bone, in an effort to produce anterior rotation, a funnel-shaped depression caused by pressure of the sacral promontory in a narrow pelvis. In most cases these depressions disappear in time, or notably diminish.

Indentations, whether made by the forceps or occurring in spontaneous labor, are frequently permanent, but are not usually the cause of any disability.

Fracture of cranial bones has been observed following spontaneous and artificial, whether natural or instrumental, delivery. The parietal bones are those most frequently fractured, especially where the fracture occurs in unassisted labor; but the frontal, the occipital, or one of the temporals may suffer this injury. The accident most frequently occurs in cases where there is a narrowing of the pelvic inlet, but it has also been observed when there was no pelvic deformity, and the child was normal in size; and it has been suggested that untimely administration of ergot may cause it, by producing violent and rapid expulsion of the child. The posterior parietal bone is the one most usually fractured, when the head is either driven or dragged through the pelvic inlet, narrowed in the conjugate diameter, the injury resulting from the resistance of the sacral promontory.

Lomer[1] has recently reported twenty-seven cases of fracture of the skull from the use of forceps. In ten cases the fractures involved the frontal bone, four of these injuries over the orbit; five were of the parietal bones. The sagittal suture was ruptured six times, the lamboidal four times, and the occipital bone detached in five cases.

If the fractures are associated with a rupture of the longitudinal sinus, a mortal hemorrhage ensues; even, however, if there be no injury to large blood-vessels, that of smaller ones may give rise to bleeding of consequence; or there may be injury done to the brain with that of the bone, so that these fractures should in no instance be regarded as trivial. Furthermore, such brain lesions may not always give immediate proof of their presence, but remote, it may be, in imperfect mental development.

Treatment.—Little is to be said as to the treatment of these various injuries. Some of them are incompatible with life, the child perishing, it may be, from convulsions. Yet, on the other hand, an infant may survive some very serious injuries of the head. By gentle and careful manipulation in suitable cases, the normal shape of the head may be restored, fragments of displaced bones being brought in apposition, and pressure upon the brain relieved.

The only injury of neck which will be referred to is that involving the sternoclidomastoid. Torticollis of obstetric origin has been attributed to injury of this muscle by one of the blades of the

[1]Zeitschrift fur Geburtshulfe und Gynakologie.

forceps. This may explain the condition in some cases, but not in all; for children born head last have been affected. It seems more probable, however, that whether the forceps were used, or the delivery was by the breach, the labor was difficult, great traction being necessary, this traction causing an injury to the muscle, ruptures of some of its fibers, and a hæmatoma results. But whatever the explanation, the characteristic condition present is a tumor situated just above the clavicle and in the muscle. As a rule, this tumor disappears spontaneously, though several weeks may elapse before the event, and the function of the muscle is not impaired permanently. Active treatment is not indicated, though after the tumor has lost sensitiveness, some recommend weak tincture of iodine, or gentle friction first, then the iodine. The galvanic current may be used. Give ten milliamperes. Place the positive flat electrode, well covered with lint, over the tumor, pressing the electrode gently while the current is being applied, the negative electrode being placed somewhere down the spine to connect the current. This should be repeated three times a week until the tumor is absorbed.

Intracranial Injuries.—These are liable to occur in different deliveries, whether these deliveries are spontaneous or either manual or instrumental. Meningeal hemorrhage is a common cause of the child perishing during labor. According to Cruveilhier, it is the cause of death in one-third of the cases of children dying at this period. Should the child be born alive, it may die from asphyxia soon after; but if the respiration is fairly established, the child may become comatose, have convulsions, usually unilateral, and die.

Gower thinks that difficult labor has a great influence in causing cerebral palsy of the new-born. The essential characteristics of a cerebral paralysis in the new-born, caused by labor, are, that there is no history of the disease or injury happening after birth, which can explain the condition, and that the paralysis gradually lessens.

Treatment.—There is little to be said as to treatment of meningeal hemorrhage. There is little to be hoped for from medicines, and, as remarked by Gower, drugs are useless unless to combat some of the effects of the disease. If associated with facial hemiplegia there is paralysis of the internal parts of the mouth, an internal injury of the nerves has occurred. Therapeutic means are without value.

Injuries of the Trunk.—There will be omitted grave lesions of the spine, such as fractures of the vertebræ and injuries of the cord, ruptures of the internal organs, whether of the chest or of the abdomen, and intra-abdominal as well as intrathoracic hemorrhage. In paraplegia in the new-born, in almost all cases death soon comes.

Muscles of the trunk may suffer from such injury that a hæmatoma, similar to that described as occurring in the sternoclidomastoid muscle, may be present. Its treatment is the same as that given for the affection previously mentioned.

Injuries of the Arms.—Fractures of the humerus are more frequent than all other fractures of the upper extremities, and of the clavicle and scapula.

The injury generally occurs in an effort to bring down an arm which has ascended in a head-last labor. The ascension is almost invariably the consequence of a hasty effort to extract the child; for if the expulsion be left to natural forces, the arms will remain folded upon the chest. Separation of the epiphysis of the head of the humerus from the diaphysis is an accident which may be overlooked, or thought to be a luxation, or a paralysis from an injury to the nerves. Kurtner[1] who has especially described this injury, states that its characteristic symptom is, that when the infant attempts to move, the humerus rotates inward. In its treatment he advises that the epiphysis, now rotating outward, be brought in contact with the diaphysis, and then the arm fixed by a bandage in a position somewhat outward and backward to the thorax. Nancrede advises, in the treatment of a fracture of the humerus, fixing the whole upper extremity in a straight position with a moulded splint.

Paralysis of the arm has been observed in connection with a hæmatoma of the sternoclidomastoid injury of the deltoid muscle, compression of the axillary nerve, or from the employment of the finger or of the blunt-hook to effect extraction of the body when there is delay after the delivery of the head, and it has followed a shoulder-presentation, the arm protruding, delivery being finally accomplished by podalic version, the want of power being independent of any cerebro-spinal lesion. Recovery is the rule in these cases.

Gower, in referring to the paralysis of the arm, remarks: "The nerves of the arms may be damaged in several ways. The injury may be associated with fracture of the humerus, and is then due either to the displacement of the broken ends of the bone, or to the force that caused the fracture. In such cases the distribution of the paralysis is irregular, and varies in each instance. In other cases, however, the injury is higher up to the roots of the nerves as they enter the brachial plexus. This injury is commonly produced by pressure at one spot, in front of the edge of the forceps, which have pressed deeply here, and has effected the injury, leaving, at the same time, a mark on the skin. In other and more frequent cases the injury is produced by the point of a traction hook, or the tip of the bent finger, placed above the shoulder for this purpose."

Fracture of the clavicle is usually caused by direct pressure of one or two fingers upon the bone in the effort to deliver the head after pelvic presentation, or after podalic version.

Treatment.—The injury is treated by fixing the arm, the forearm being flexed, by means of a roller bandage, to the chest, and then properly supporting the member. The child should be, as far as possible, kept lying upon the back. The fracture is consolidated in six or seven days.

[1] Uber die Verletzungen der Extremitaten des Kindes.

Injuries of the Lower Limbs.—A few instances of the fracture of the femur occurring in spontaneous labor have been reported; but most frequently this injury has followed an effort to bring down the thigh in a case of pelvic presentation, where the presenting part was in the mother's pelvis, before pushing up that part so that room for movements of the thigh could be given, or from traction upon the thigh by means of the fillet or the blunt-hook.

Dr. Nancrede advises that sheets of vulcanite should be used in the treatment of fractured femur. The material is softened in hot water and accurately moulded to the limb. "An anterior splint should be made which will extend well up over the abdomen, and a posterior splint which will reach from the buttock well below the knee, thus fulfilling the important indication of fixing the joints above and below the fracture. It requires only ten or twelve days for a firm union to occur."

Dislocation of the hip in obstetric operations is exceedingly rare. Ruge states that he has not found one in three hundred autopsies of the new-born.

An unusual position of the lower limbs is observed for several days after labor in that variety of pelvic presentation described by some writers, in which the thighs are flexed upon the abdomen, and the legs extended upon the chest. The limbs for a time remain in the same attitude which they occupied during pregnancy and in labor, and it is in vain to attempt to place them in any other.

CHAPTER XIX.

INFANT FEEDING; WEANING.

The superiority of breast-feeding is so generally acknowledged that it may be said to have become a scientific statement.

The great number of artificial foods used by physicians, according to the fashion of the day, only proves that bottle-feeding has not as yet arrived at that state of perfection where it can compete with breast-feeding.

The feeding problem is one which is hedged about with many difficulties, on account of the great diversity of individual circumstances and idiosyncrasies.

Certain infants, for instance, may thrive on peculiar mixtures not adapted to infants as a class. Many will not thrive on that food which nature has provided, and the well-being of an infant will depend much upon the circumstances by which it is surrounded, such as affluence or poverty, country or city life.

In those cases where, for one reason or another, human milk is not available, the question of feeding is this, What may be given to take the place of nature's food? In supplying a substitute we should copy in every possible way the physical and chemical characteristics of the food which is universally acknowledged to be the best.

What is of the first importance is that we should recognize our ignorance, and, keeping our eyes opened to all possible scientific advancement, be ready to sweep aside preconceived ideas not resting upon established facts.

Young animals at birth begin to receive their nourishment immediately, and a corresponding increase in their weight takes place from almost the first day of life. The human infant, in like manner, should begin nursing early, getting what it can from the breast until the full supply of milk has come. In this way it will not be so likely to have a large initial loss of weight to recover, by which it is often handicapped at the very beginning of its career, when there is most danger to be anticipated from a depression of its nutrition. In the early days of life, every day, every hour, is of the utmost importance; and, provided it can be done without detriment to the condition of the mother, the sooner the child is put to the breast the better it will be. The continual increase in weight is of very great importance in the first year, as it is the chief index by which we note the progress of nutrition and judge concerning the desirability of continuing the food. An average gain of from twenty to thirty grammes, or about two-thirds of an ounce, a day through the rest of the year, makes a

successful line of nutrition, and may be used as a working basis for the management of the food.

A healthy baby empties the breasts with easy and almost uninterrupted sucking in about fifteen minutes. The quantity ingested is determined by various methods, such as by careful weighing before and after nursing, and by the determination of the actual capacity of the average stomach at different ages and with different weights. These results are of great practical importance, as we will state later on when we come to speak of artificial foods.

The intervals of feeding constitute a very important factor in breast-feeding, where the quantity is regulated by the breast itself. According to Frolowski,[1] it can be represented by the ratio (that is, the activity of growth in the stomach's capacity) of one for the first week to two and one-half for the fourth week, and three and one-fifth for the eighth week, while it is only three and one-third for the twelfth week, three and four-sevenths for the sixteenth week, and three and three-fifths for the twentieth week. The first month is the most critical period for the infant's nutrition, as it is the time when the equilibrium of its metabolism is being established, and its chance for life is the least; hence, especial value should be attached to the series of careful investigations made at the Children's Hospital in St. Petersburg, by Ssnitkin,[2] to determine the amount of food which should be given during the first thirty days of life, and from which is deduced the rule, "The greater the weight, the greater the gastric capacity."

Ssnitkin's general results show, also, that one one-hundredth of the initial weight should be taken as the figure with which to begin computation, and to this should be added one gram, or two-thirds of an ounce, for each day of life. The following table represents merely approximate average figures, which are the results of computations made by a number of observers in different parts of the world.

TABLE I.

The average initial weight of infants is about 6.6 to 8.8 pounds, or 3,000 to 4,000 grams.

The average normal gain per day in the first five months is 20 to 30 grams, or about two-thirds to one ounce.

GENERAL RULES FOR FEEDING.

Age.	Interval of Feeding.	No. in 24 Hours.	Average at Each Feeding.	Av'ge Amount in 24 Hours.
1st week.....	2 hours	10	1 ounce	10 ounces
$\frac{1}{6}$ week.....	2½ hours	8	1½ to 2 ounces	12 to 16 ounces
6 to 12 weeks, possibly to 5th or 6th mo.	3 hours	6	3 to 4 ounces	18 to 24 ounces
6 months	3 hours	6	6 ounces	36 ounces
10 months.....	3 hours	5	8 ounces	40 ounces

[1] Inaugural Diss., St. Petersburg, 1876.

[2] Reitz, Physiologie Des Kindesalt, S. 40.

It is necessary to consider the weight as well as the age in determining the amount for each feeding in the individual infant, the rule being one one-hundredth of the initial weight, one gram for each day during the first month.

The following illustration of the above rule serves as guide for especially difficult cases:—

Initial Weight.	Each Feeding.		
	Early Days.	15 Days.	30 Days.
3,000 grams.....	30 grams (About 1 ounce)	30+15=45 grams (About 1½ ounces)	30+30=60 grams (About 2 ounces)
4,500 grams.....	45 grams (About 1½ ounces)	45+15=60 grams (About 2 ounces)	45+30=75 grams (About 2½ ounces)
6,000 grams.....	60 grams (About 2 ounces)	60+15=75 grams (About 2½ ounces)	60+30=90 grams (About 3 ounces)

The only point in the feeding problem where artificial feeding seems to have the advantage of the breast is in the intervals of nursing, irregularity in nursing, frequent nursing, and too prolonged intervals, which often so disturb the quality of human breast milk as to transform a perfectly good milk into one entirely unfitted for the infant's power of digestion. But the element of intervals does not, of course, influence the question of chemical composition in a properly-prepared article of food. Thus, too frequent nursing lessens the water and increases the total solids in human milk, making it resemble in a certain way condensed milk; while too prolonged intervals result in such a decrease of the total solids as to render an otherwise good milk too watery, and unfit for purposes of nutrition, however well it may be digested. General rules for the feeding intervals should be enforced, such as are represented in table 1, in order that mothers should not interfere with the infant's digestion by nursing it too frequently, and thus giving it too concentrated food, nor, by neglecting to feed it often enough, interfere with its nutrition by giving it a too largely diluted food. We must recognize two distinct elements in infant feeding, neither of which can with impunity be interfered with at the expense of the other, namely, digestion and nutrition. It is possible for the milk to be easily digested, and it is the equilibrium of these two elements which makes up a perfect infantile development.

The younger the infant, the greater the metabolic activity, and hence the greater need for frequent feeding; for nutriment is required, not only for repair and waste, but also for the rapid proportionate growth; and we thus see that to regulate the intervals of feeding according to the age, as shown in table 1, becomes essential in successful feeding.

The next question to be considered is the quality of the food which

is provided for the human infant. The analyses upon which most reliance is to be placed, are those of J. Konig, Forster, Meigs, Harrington, and others; we give the approximate results:—

TABLE II.

Human Milk.

Reaction	slightly alkaline
Specific gravity	1028-1034
Water	87-88
Total solids	13-12
Fat	3-4
Albuminoids	1-2
Sugar	7-0
Ash	0-2

Human milk has also been shown to be sterile by Escherick, who experimented with the milk of twenty-five healthy women, and found that, by keeping it in sterilized tubes, it remained unchanged for some weeks.

The greatest variety of substances has been found in the milk, but no definite rule as to the amount of this elimination has yet been established, so that our knowledge of the existence of this process is valuable as a prophylactic against harm, rather than as a means of direct benefit to the infant in disease. The latter point will not be discussed here, except to draw attention to the fact that the medical treatment of infantile diseases through the breast milk is said to be exceedingly inexact.

We must also recognize the clinical fact that it is not only when the milk is in poor condition that this elimination takes place, but that it may occur at any time during the nursing period in the breasts of women, who, so far as we can ascertain, are in a perfectly healthy condition. Thus, every practitioner has at times, doubtless, observed the laxative effect on the infant of such drugs as the compound licorice powder given to the mother. A case is on record where a baby vomited for weeks while taking the milk from the breast of a mother who was unusually strong and well, but was in the habit of drinking, daily, a considerable quantity of porter. The vomiting ceased at once, and did not return, after the porter was omitted.

Both the secretion and the character of the milk are strongly influenced by the nervous system. This fact has become a matter of common clinical experience, but the exact nervous mechanism which controls it has not yet been fully worked out. The result, however, is recognized, that emotional mothers do not make good nurses.

A healthy mother should nurse her child. The younger the infant, the more important the breast nursing, and certain of its funccanal is in a more active state of development, and certain of its functions are still unprepared for use in the early months of life. It is

very difficult to adapt an artificial food to the sensitive, growing, infantile digestive apparatus at this early age; and this accounts, in a measure, for the rule that the younger the child, the greater the mortality. There is no doubt, however, that the mother's milk, in a considerable number of cases met with in the practise of physicians among civilized nations, appears to be entirely unfit for her offspring; and it at times becomes a question of considerable importance as to whether the infant shall be withdrawn from its mother's breast, either temporarily or entirely.

I am fully convinced that a large number of infants are deprived of their natural food, and placed on artificial foods, on insufficient grounds. We thus assist to keep up the high mortality figures; and I believe that these figures will sensibly reduce when, in consequence of our taking a more enlightened view of the subject, we shall increase the number of infants who are fed from the breast during the first three or four months of life.

A particular reason, among many, for waiting at least four or five months before beginning artificial feeding, is that after a rapid growth the stomach has, by the fifth or sixth month, become a more perfect receptacle as to both size and function.

A simple illustration of weaning for insufficient reasons will be cited in the case of an infant three months old, which was brought to a physician to have its artificial food regulated. The history of the case was that its mother, a healthy primapara, about twenty-two years old, had nursed the infant for six weeks, during which time the infant was fretful, suffered much from colic, and never seemed satisfied. For these reasons, although there was a gain in weight, and the napkin showed a fairly good digestion, it was, by the advice of the attending physician, weaned at once. On careful inquiry it was found that this infant had been nursed almost continuously night and day, with intervals usually of only one hour, and it was evident that the frequent nursing had resulted in producing a concentrated milk, which the infant's gastro-intestinal canal was rebelling against; and at six weeks of age the infant was deprived of its supply of breast milk in July, and placed upon an artificial food containing seventy-eight per cent of starch, simply because the important factor of intervals had not been thought of as a means of improving the milk and relieving the pain and apparent hunger.

On the other hand, the general health of the mother should be carefully investigated, as women suffering from constitutional syphilis or chronic consumption are manifestly unfit for nursing; and at the same time we should be careful, unless decided symptoms of disease are present, not to set aside the milk of a delicate-looking woman until it has been analyzed.

Instances frequently arise where such continued shocks are brought to bear upon the mother in her daily life, or where her own tempera-

ment is such an undisciplined one, that her milk, ordinarily good, becomes totally unfit for her infant, and at times acts as a direct poison, with most disastrous results; the welfare of the infant in such cases unquestionably demands a wet-nurse.

A nursing mother should be made to understand that these variations are liable to arise, however good her general health may be; and that while she is simply fulfilling a duty demanded by nature from those who bear children, her duty, when she has once undertaken to nurse, is to avoid these variations as far as possible, by regulating her life to a normal lactation. And it comes within the province of her physician to explain this as he would any other branch of rational medicine; for many a mother, by her course of life, renders her milk unfit for the proper alimentation of her infant, through ignorance of what seems to the physician but a simple dictation of common sense; and she will be only too thankful for advice on this subject. Instances are on record, which were observed by Yukowski, where seasons of fasting, with their accompanying excitement of the emotions, have had such an influence on the milk that the fat especially has been decreased to as low as 0.83, and many nursing infants became sick and gave evidence of imperfect nutrition.

We must next consider the question of the variations of the milk which take place from natural causes, such as the return of menstruation. We must be guided by what seems best for the individual case.

Infants are at times affected so seriously by the alteration in the constituents of the milk which occurs once in four weeks that their nutrition is markedly interfered with, and a change to a more stable food is indicated. Again, the only disturbance which arises is a temporary and slight digestive attack for a day or two, which apparently does not materially affect the infant, and makes us hesitate to run the risk of depriving it of a food on which it thrives during twenty-six days out of twenty-eight. We must also not be too hasty in concluding from a bad symptom in the infant that we should at once withdraw it permanently from the breast, for the menses may appear once and not again for a number of months; the infant's power of digestion in the meantime becomes so much more fully developed that it is unaffected by the catamenial milk. Even where the catamenia recur regularly, the disturbance which may have been marked at one period may for many reasons fail to recur at the next period, so that the question is reduced to whether the composition of the milk shows a recovery of the equilibrium of its constituents within a few days, or remains affected to such a degree as to endanger the integrity of the infant's nutrition.

My own experience, so far as it goes, is in favor of allowing the infant to continue with the breast, unless it is decidedly contraindicated by circumstances such as have just been mentioned.

I have seldom met with a case which could not without permanent injury be tided over the small amount of temporary digestive dusturb-

ance usually met with. Very frequently we have met with cases where it never produced any appreciable effect at all. The probable cause of these catamenial disturbances is the deficiency in fat in the milk and increase in its albuminoids; and following the general rule of disturbed mammary secretion, the condition is such as to interfere temporarily with both digestion and nutrition.

It is a much more serious affair when the nursing mother becomes pregnant, for here the almost universal clinical experience is that the infant, for various reasons, can not continue to be fed by its mother, it being unusual for a woman to have sufficient vitality to nourish properly her living child and the growing fœtus. There is danger of reflex miscarriage from continual irritation of the mammary gland by nursing. The writer believes that under almost all circumstances a pregnant woman should wean her infant, since we know how to prepare food for infants. The mother does not run the risk of reflex miscarriage, and thereby, in all probability, saves the life of the unborn; the mother's health will remain in a normal condition, consequently her strength is maintained for the perfect development of the fœtus.

The food of the nursing woman is closely connected with the food which she provides for her infant. We have already spoken of the possibility of the elimination of various substances by the mammary gland, and we should impress upon nursing women the importance of a more carefully arranged regimen than when they are not nursing, and of a limited use of drugs. Saline cathartics may at times not only act unfavorably on the infant, but may very decidedly lessen the flow of milk, or even stay it altogether. Certain vegetables, such as sweet potatoes, and in some instances I have known beans and cabbage, cause colic in young infants. When the mother omitted these from her diet, the child never had any more colic. In some individuals the use of fish will cause discomfort to the infant. A plain mixed diet, with a moderate excess of fluids and albuminoids over what they are normally accustomed to, will, as a rule, give the best results.

We should also be exceedingly careful about suddenly changing the customary diet of a healthy nursing woman on purely theoretical grounds. "The mistake was made for many years of keeping women on too low a diet in the early period of lactation, with a consequent delay in the establishment of a sufficiently nutritious milk supply, and a correspondingly-increased initial loss of weight in their infants. Where, however, we are especially likely to err is in permitting a healthy, hard-working wet-nurse, accustomed to a somewhat coarse but nutritious diet, on entering a refined home to adopt totally different habits of exercise and an unaccustomed diet, rather than endeavoring to have her continue in her natural mode of life. This sudden change of life frequently results in ill health to the nurse, with its accompanying deterioration in the quality of her milk, or at least in so changing its quality as to make it an unfit food for her foster-child."

It not infrequently happens, especially among women of the upper

classes, and nursing women of all classes, when their general health is not in a perfectly normal condition, that the supply of milk is not sufficient to satisfy the infant, and the question arises whether the mother's milk shall be entirely given up, or whether it shall be supplemented by some other food. In my own private practise I have found it advisable to assist the mother to nurse her infant during the early months of life. Where the artificial food is carefully regulated until the infant is making decided progress in its weight and general condition, this method of rearing infants is far superior to withdrawing the mother's milk, and feeding the child exclusively upon artificial food.

It is a fact pretty widely acknowledged that the mother's milk, as a rule, is more likely to be suited to her infant's digestion than the milk of another woman. The reverse of this proposition has also been held true, that at times idiosyncrasies in the mother's milk will make it radically unfit for her infant. A wet-nurse is to be preferred to artificial food, and is most likely to give more satisfactory results.

The question as to whether a wet-nurse shall be employed is, however, one of serious importance, and must in each individual instance be decided by giving full weight to all the many circumstances which are involved in the case. It is the duty of the physician to fully explain that a good nurse is far superior to any artificial method of feeding, while the reverse of this statement must always be kept in view, that a poor nurse, whether from temperament or age or general health or quality of her milk, had better be set aside where conditions are favorable for a successful artificial feeding. It is considered better, perhaps, that the nurse's milk should correspond in age somewhat nearly to that of the infant she is to suckle, but a difference of some months will not be of vital importance in choosing a nurse. A feeble child will nurse more easily, and probably have better care, from a multipara than from a primapara. The preferable age of the nurse is between twenty and thirty years. Her other requisites are a condition of good health and a quiet temperament. It will save time, and perhaps trouble, if her milk be analyzed beforehand; in fact, all the requisites should be inquired into.

Quite a number of nursing women, especially those in the higher classes, find that at variable periods in the course of their year's lactation, their milk begins to fail, and they are forced first to lessen the number of their nursings, and then to wean entirely. The time, then, when the infant should be weaned almost always settles itself without our intervention, at varying periods. The period of lactation, and the one which might be called physiologically normal, can, when the breast milk remains of good quality and quantity, be carried through the first year with benefit. We have certain guides which aid us in determining the proper time for beginning to wean. Physiologically, we are told that certain functions, such as that which converts starch into glucose, are but slightly developed in the early months of life, and that they are gradually established during the first year, but that, as a rule, they do

not exist in perfection, in such a condition that we can call upon them with impunity, until the last two or three months of the year. Another sign which aids us somewhat as an index by which we can judge of the progress of this functional development, is the appearance of the teeth, calling our attention to the fact that nature is preparing a means for the infant to digest and assimilate a different form of food from that which it has so far received by sucking, the presence of six or eight incisors usually, in the normally-developed infant, corresponding to the full development of the pancreatic secretion.

Again, a most valuable index, which assures us that we need not be anxious to change the infant's food during the first year, is the continuous increase of weight, which, with the general blooming condition of the infant, represents a normal lactation. As in the case of all physiological rules, however, we must admit of certain variations which in especial cases are as important for the infant's welfare as the rule itself, namely, the curtailing or lengthening of the period of lactation by a month or two, according to the season of the year, the eruption of the teeth, or the condition of the child, as in recovery from illness, it being wiser to feed the infant from the breast during the heated portions of the year, and to wean in cool weather, either before or after the hot season, according to the individual circumstances of the case.

An interdental period also is preferable to a dental period, on account of the possible disturbances which may arise in the latter, and interfere with the proper action of the new functions which are being called upon to perform their duties. Where there is an uncertainty as to the character of the milk which the infant is taking, especially in the latter months, though not so difficult to manage intelligently as the early period of the infant's life, it is much more likely to need careful supervision than during the middle period, which, from its uninterrupted tranquillity, has been called the period of normal nutrition. Where the infant has, through an insufficient supply of milk in the mother, become for some time accustomed to several meals of artificial food daily, the matter of weaning becomes a very simple one, for we know we have a food which will agree with it; but where we have to begin to wean directly, and to adapt a food to the infant's digestive capabilities, as in cases of sudden failure of the milk or sickness in the mother, the procedure becomes much more intricate, and is at times fraught with considerable danger.

Unless under very exceptional circumstances, sudden weaning is to be deprecated, though we must allow it is often done with impunity. The safest method, so long as we can never judge beforehand what infants will be likely to be unfavorably affected by sudden weaning, is to take plenty of time, and gradually ascertain, perhaps by frequent changes, which form of food is best adapted to the case. We then gradually limit the child to this food, omitting one by one the breast feeding, until finally we are sure that we have an artificial food on which the infant will thrive, with the proportion of starch, the new element which

may now usually be introduced into the dietary, carefully adapted to its amylolytic function, which has but lately arrived at its full development, and which varies in different infants. When this change has been accomplished, the breast can with safety be entirely withdrawn.

The danger of injudicious weaning must be guarded against. I will relate the following recorded case as an illustration of the importance of careful consideration as to what effect some kinds of food have upon an infant:—

Dr. Sinclair's Case (Boston).—"A rather delicate nursing infant, fourteen months old, and backward in its development, having cut only four teeth, and being in the process of cutting four more, was, without the advice of the physician, suddenly deprived of the plentiful supply of breast milk of its healthy mother, in the latter part of November, and fed upon oatmeal gruel. Vomiting and prostration immediately began, and continued until the oatmeal was omitted and the breast resumed, when the infant began to thrive. Three months later, through ignorance of the cause of the first attack, the mother again weaned her infant suddenly, and again, without any preparation, fed it on oatmeal gruel. On the following two days the infant vomited incessantly, and was much prostrated. The oatmeal was then changed to barley, and this again to Mellin's Food. The symptoms, however, grew worse, and the thoroughly terrified mother again put the baby to her breast, with, however, this time a disastrous result, as her milk, from nervous influences, was so changed in its quality that it acted like a poison on the infant, which fell into a condition of collapse. Dr. Sinclair was sent for, and a few hours later had a healthy wet-nurse with a four-months baby procured, and after several days of complete prostration the baby began to revive, and somewhat later was gradually weaned without trouble. It may be well to add for the encouragement of those who may in their practise be so unfortunate as to have cases of this kind (as well as encouraging to the mother), that after the mother's milk had poisoned the infant—and when I first saw it the skin was gray and cold, the fontanels sunken, and the eyes fixed—yet recovery took place."

The question of expense should not for a moment be considered by those who can afford to have an analysis made of the breast milk; for not only will real benefit come to their own children through money spent in this way, but these analyses, by being published and collated, will prove of great value for the proper regulation of the feeding of infants in all classes of society.

The mere microscopic examination of milk, beyond the determination of the presence or absence of colostrum corpuscles, is too uncertain and misleading to be in any way depended on, the chemical analysis being the only practical method which can be recommended.

There is, however, an error which we must always allow may interfere with the true analysis of the milk which the infant has actually received into its stomach at the end of the nursing, and which must

necessarily invalidate the reasoning from our analysis. This has been suggested in what has been said in speaking of the changes which from slight causes may arise, and influence the especial specimen which is being analyzed. Thus, we should recognize that the milk varies considerably in its percentage of fat and total solids in the different periods of a milking, and that the composition of the milk which the infant has in its stomach may differ very widely from the composition of a specimen taken directly before or after nursing.

Harrington's analysis of three portions of a milking will illustrate the meaning of what has just been said.

TABLE III.

(Harrington's Eighth Annual Report, Massachusetts State Board Health, 1884, p. 189.)

	Fat.	Total Solids.	Water.	Ash.
"Fore-milk"	3.88	13.34	86.66	0.85
"Middle-milk"	6.74	15.40	84.60	0.81
"Strippings"	8.12	17.13	82.87	0.82

We are already led to expect to find in the poor milks, those that do not agree with the infant, an excess of albuminoids and a diminution of fat beyond what we have so far been able to determine as the normal average percentage of these two elements. Again, where a variation takes place in the milk, it is more likely to be found in the fat and albuminoids than in the sugar and total ash. We would also advise a number of analyses rather than one, in order that an error of an especial and temporary variation may be corrected.

In the preceding pages great stress has been laid upon the importance of feeding infants during the early months of life by means of human milk. We know that in civilized communities the necessity of supplying the infant with food not from the human breast will often arise, and artificial foods will in all probability be demanded, and that this state of affairs will increase rather than decrease as our civilization advances. With this prospect before us, and appreciating the difficulties which in a large number of cases are liable to arise when we attempt to adapt an artificial food to the wants of an infant, it manifestly becomes a duty to endeavor to reduce the high mortality figures induced by artificial feeding. With this purpose in view, we should carefully investigate the different methods of feeding, and adopt some uniform plan for starting human beings in life; for diversity and not uniformity is now the rule. With a very few exceptions, including the small percentage of inherited diseases which occur at birth, this diversity of method in feeding is the most prolific source of disease in early infancy. The group of symptoms which for want of a better name is represented by dyspepsia,—bad digestion,—occurs most frequently in the three periods when the infant's digestion is likely to be tampered with, namely, in the early weeks of life, when experiments

are being made to determine what will be the best to start with; next, when, in addition to the irritation arising from the beginning of dentition, new articles of diet are added to the original food; and, thirdly, at the time of weaning, when there is often a sudden and entire change in the character of the food of the greatest comparative importance, because it is then when, as before stated, the stomach is in its most active period of growth, and when the function of digestion is established, and, following the rule of fundamental establishment, is in a state of unstable equilibrium.

This demands the most careful regulation of the bulk of food given, to make it correspond to the rapid increase in the gastric capacity. We thus avoid the danger of overtaxing this capacity by too great volume in the beginning of nutrition, at the same time providing the sensitive developing function with the proper materials for nutrition, and thus avoiding by prophylaxis the dyspepsia of the later periods of infancy and childhood, the seeds of which are continually being sown in this early transitional period. We therefore have not only the question of infantile digestion, but also that of infantile development, to deal with. We should recognize the fact that the problem of artificial feeding is not a simple one; and we can not too often reiterate that the question which but too commonly is supposed to be a simple one, and the one which in the greatest majority of cases is alone considered, namely, "Which food shall we give to the infant?" is a misleading one and insufficient. It would seem, also, that the present is a most opportune time for raising a note of warning against allowing our enthusiasm over any one especial theory to warp our better judgment. The feeding problem is a combination of factors of which the kind of food is only one; and, personally, I have long been convinced that the neglect to investigate thoroughly and carry out in detail the combination of these by no means insignificant general factors has had much to do with our failure with artificial feeding in the past. If this fact is more uniformly insisted on in the future, it will prove to be of great value in the reduction of the mortality figures in the first two years of life.

"To feed an infant one month old with six ounces of acid cow's milk every four hours, no matter if such a mixture has been sterilized, would be a radical offense against well-known anatomical and physiological laws." It therefore seems to me that time will be well spent in the discussion of the subject of artificial feeding, if we investigate and endeavor to copy, each in its turn, the various devices which nature makes use of; for we must admit that we are not in a position to improve on nature's method. It is certainly wiser and more economical not to spare expense and trouble in arranging the diet for infants; for, as has been explained above, the period of active growth of an organ is the time when its functions are a prolific source of annoyance and expense in childhood and adolescence. Cheap foods and cheap methods of feeding, unless they are the best that can be procured, should not

be tolerated any more in the early feeding of infants than in adult life; in fact, not nearly so much. We often, however, see a food recommended for a young infant because it is cheap and easily prepared, when it is well known that its lack of nutritious ingredients would, with adults, stamp it as unfit for food.

In discussing the treatment of disease, we advocate what is best without reference to what it costs; and then, in the especial case where the expense is an element which has to be taken into consideration, we endeavor to adapt our treatment to these considerations, but always approaching as nearly as possible to our first standard. In like manner we believe that we are doing wrong to the public if we allow ourselves to be handicapped in such a difficult question as infant feeding by the cry of expense. Infant feeding is an expense which is vital to the welfare of the human race; and we can, without extravagance, safely relegate to the province of the manufacturers of patent foods the recommending to the public of foods which, if judged by the amount that is offered in bulk, are cheap, but which, when judged by their nutritious properties, are extremely expensive.

Our scientific knowledge and clinical investigations have not yet enabled us to follow nature exactly, and we therefore have not yet obtained an ideal method of artificial feeding. We must nevertheless go as far as the present state of our knowledge will allow, thus gaining a little ground every year; and we must be especially careful not to be led astray by the fictitiously brilliant results which are reported from time to time in favor of certain foods.

Instances are continually occurring where one food will fail, and another, when substituted for it, succeed; and yet these successes are merely temporary, and the mortality always remains far above that from human breast-milk.

In nature's method of feeding, which must ever be remembered as the best and first, a receptacle, the human breast, which provides a fresh supply of food at proper intervals, absolutely prevents fermentation of the food before it enters the infant's mouth, incites the action of the necessary digestive fluids, avoids a vacuum by collapsing as it gradually is emptied, thus allowing the food to flow continuously, and finally is practically self-regulating as to the amount of daily food according to the infant's age; secondly, the food itself is adapted to the infant's digestive function, and for its development, by its temperature, 98 degrees to 100 degrees Fahrenheit, in its alkaline reaction, and its chemical constituents. Given these factors, how nearly can we approach them artificially? Human ingenuity has not yet been able to devise anything which approaches the perfection of nature's receptacle, and the best we can do to offset this complex mechanism is to adopt that which is exactly the reverse, namely, a receptacle of absolute simplicity; and thus combat the tendency to fermentation by preventing, through perfect cleanliness, the receptacle from becoming a source of fermentation.

The rubber nipple takes the place of that of the breast, and a small hole near the end of the feeding tube prevents a vacuum being formed and regulates the rapidity of the flow, while it allows it to be continuous; this is done by rolling up the edge of the rubber nipple from the hole with the finger, or letting it cover the hole, according to the demand shown by the infant. The artificial receptacle is not self-regulating, and hence we must determine anatomically the amount of food in bulk which nature provides for the average infant at different ages, and from these average figures deduce the proper amount for the special infant. The feeding-tubes are graduated for the most important periods of growth, for the purpose of continually impressing upon the mother and nurse what the physician often only has the opportunity of telling them at the beginning of the nourishing period, namely, that the error is in giving *too much* food rather than too little; an error which naturally results, when, as is commonly the case, the usual eight-ounce nursing-bottle is provided as the receptacle at the very beginning of infantile life.

Ref rring again to Frolowski's investigation (see table 1, General Rules for Feeding), we see that there is a very rapid increase in the gastric capacity in the first two months of life, while in the third, fourth, and fifth months the increase is slight. Guided by these data, which we find corresponding closely with the results of clinical investigations bearing on this point, we should rapidly increase the quantity of the food in the first six or eight weeks, and then give the same quantity up to the fifth or sixth month, unless the infant's appetite evidently demands more, when, of course, a gradual increase should be made. A considerable increase in the quantity needed takes place, also, between the sixth and tenth months.

Of the different causes which regulate the gastric capacity, the weight of the infant has the greatest influence, and it is perfectly possible for a poorly-developed infant of small weight to have a gastric capacity no greater than a normally developed infant of half the age. This possibility must be taken into account when we attempt to regulate the bulk of an artificial food to the age of the infant. We have seen an infant six weeks of age whose general development and weight corresponded so closely to those of the general average infant of twelve weeks, that it was self-evident that the two ounces of food which would ordinarily have been the proper allowance, so far as its age was concerned, was not sufficient, and that its weight indicated a gastric capacity for an allowance of four ounces; and in fact it took this amount, and digested it with the greatest ease, while with any less than the four ounces it was never satisfied.

Another very important influence on the gastric capacity is the kind of nourishment which the infant has received.[1] The breast-fed infant in the early months of life has a uniformly developed stomach, and, as a rule, of smaller capacity than the stomach of the artificially

[1]Fleischmann, "Die Ernährung des Sauglingsalters," p. 17.

fed, the muscular fibers of the fundus in the latter stomach being weak and its form abnormal.

It is common in the artificially fed, where the quality of the food is poor and the quantity too large for the age and development, and where rachitis has been a consequence, to find the stomach dilated to a capacity entirely out of proportion to the infant's age and weight.

The figures in table 1 provide us with a fair working basis by which we can determine the amount of food to be given at different ages, so as to correspond to the marked periods of the stomach's growth.

Figures 27, 28, 29, and 30 represent feeding-tubes drawn on a scale

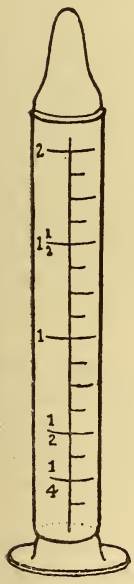

Fig. 27.

Fig. 28.

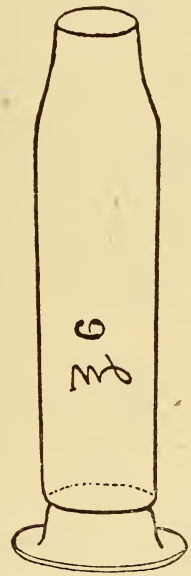

Fig. 29.

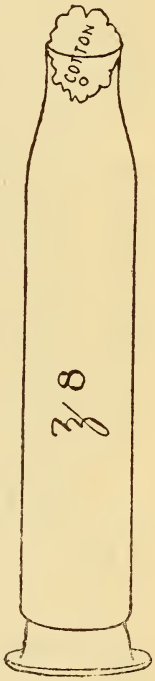

Fig. 30.

of about one-third, and have the proper capacity for the amount of food which should be given to the infant during these periods.

Figure 27 is a tube of small caliber, graduated to hold two ounces, and intended to be used for feeding during the first six weeks of life, and later as a measure for the larger tubes in preparing the artificial food in its varying proportions.

The tube 28 holds four ounces, and has a caliber of one and five-eighths inches and a height of six inches; it is to be used from the sixth week to the fifth or sixth month, and is intended to correspond to the above-described rapid growth of the stomach in the first two

months, and its significant further increase in size up to the fifth and sixth month. It is represented in the diagram with the nipple adjusted for use.

The large tube, Figure 30, has a caliber of one and six-eighths inches, and a height of eight and three-fourths inches, corresponding to the common half-pint nursing bottle. It is represented in the figure without the nipple, and shows the air-hole, which, together with the mouth of the tube, is stopped with cotton. Another medium-sized tube has been made to go with the set, and this has a caliber of one and six-eighths inches, a height of seven and three-fourths inches, and holds six ounces. It is not a necessity, but is intended to be used between the sixth and tenth months, merely to enunciate the importance of careful supervision of quantity throughout the first year, as where a food qualitatively correct is being used, the error, as a rule, is in giving too great amount. It is represented in Figure 29.

A few words regarding the process of sterilization and the connection of bacteriology with the feeding problem will here be necessary, as explanatory of what will be said later about especial artificial foods. The practical utility of destroying the developed bacteria in the milk in certain intestinal disorders has long been recognized clinically. Jacobi many years ago recommended that the milk to be used for the infant during the day should be boiled as soon as received, and kept in tightly-stoppered bottles, inverted on ice. Lister has shown that cow's milk as it comes from the udder is sterile, and that it quickly becomes infected in various ways, as by the hands of the milkers, the air of the stable, etc.

Professor Soxhlet, of Munich, found that calves one week old, when taken from the udder and fed with their mother's milk from a trough, were affected with diarrhea, which disappeared on their being fed again directly from the udder. Soxhlet's experiments also showed that under the same condition of temperature the milk of three cows as ordinarily milked, turned sour in about half of the time that the same milk did when the udders and milker's hands were carefully washed, and other precautions for cleanliness were taken before milking.

Dr. Ernest's advice several years ago was to sterilize the milk in a receptacle from which the infant can be fed without pouring from one vessel to another, and thus running the risk of fresh infection, and this method is now in general use in cities. A single steaming, however, may not destroy the spores which may be developed later, unless the process is several times repeated. A single steaming, or the first sterilization, or killing of the germs, is in all probability all that is necessary for immediate use for the purpose of feeding.

Figure 31 represents the sterilizers with the water boiling under the liter flask, which is stopped with cotton, and the four-ounce feeding-tube, with its mouth, its nipple, and its air-hole tightly inclosed in rubber cot, as described on the following page.

A gas flame is preferable to that of an alcohol lamp. This steamer answers very well for sterilization, such as is necessary in infant feeding. It is simply a tin pail eight or nine inches in diameter, and nineteen or twenty inches deep, raised on three legs sufficiently high to allow a burner to stand under it. (Bunsen's burner is a good one.) Four inches from the bottom of the cylinder is a perforated tin diaphragm on which the feeding-tube stands while being sterilized. There is a small vent for the escape of the steam in the cover. Water is placed in the bottom of the steamer to the depth of about an inch, and in about ten minutes after lighting the gas-jet, the water begins to boil. The food is then poured into one of the feeding-tubes, and an ordinary rubber nipple adjusted as on any nursing-bottle. Over the nipple, as an extra precaution for the exclusion of contamination, a non-perforated rubber cot is drawn tightly down on the tube. As soon as the water has been boiling for a minute or two, the tube is placed in the steamer, the cover applied, and the steaming continued for twenty minutes. The tube can now be removed, allowed to cool until of a proper temperature, 98 degrees to 100 degrees Fahrenheit, and on removing the rubber cot and putting the nipple in the infant's mouth, the food is received as sterile as from the human breast, so far as the developer bacteria are concerned. Food sterilized in this way can be kept for a number of days, and can be utilized when the infant is to be taken on a journey. Where long journeys are to be taken, such as an ocean voyage, or across the continent, the sterilization should be repeated several times with intervals of a day, and the flasks used for the sterilization hermetically sealed. Food prepared in this way will keep sweet for weeks. Where the steamer just described can not for any reason be obtained, and also the gas or an alcohol lamp, as off in the country, for instance, a simple colander or potato steamer with a close-fitting lid, with a small outlet for the steam to escape a little, may be placed on the teakettle, and makes an effective sterilizer. The food can also be sterilized by immersion in boiling water, or by directly boiling the food itself.

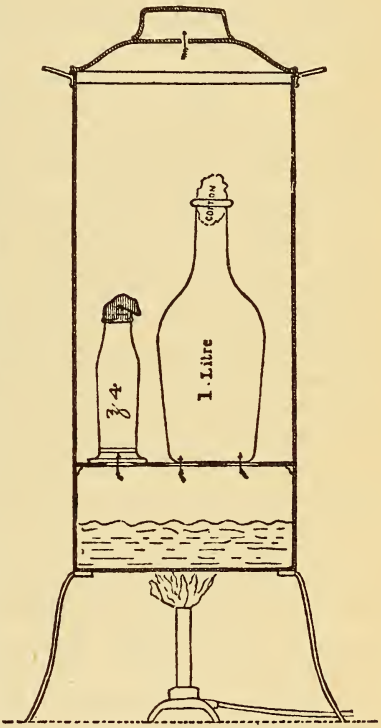

Fig. 31.

The question as to whether the milk should be boiled or steamed is not one of a great deal of significance, and can be settled according to the fancy of the individual practitioner, the object of sterilization being accomplished in either case.

"Boiled milk does not become sour as quickly as raw milk, due, of course, largely to the fact of its sterilization."

As to the effect boiling has on the digestibility of milk, there is difference of opinion. There is a general impression that boiled milk is more constipating than new milk, which is probably derived from the fact that milk sterilized by boiling is less likely than raw milk to cause diarrhea.

According to Schreiner[1] and to Randolph,[2] boiled milk is more quickly coagulated by acids than raw milk, while the reverse is the case with regard to the action of rennet. Thus, raw milk at the body temperature coagulates firmly almost immediately on the addition of a neutral rennet solution, whereas, boiled milk under the same conditions does not clot for a far longer period, and the coagula are not so firm. The odor and taste of boiled milk are present when milk is steamed, but to a much less degree than with boiled milk; and while a thick scum is formed on milk boiled for twenty minutes, which is tenacious and does not disappear on shaking, only a very thin scum forms on milk steamed for twenty minutes, and this is not tenacious, and almost entirely disappears on shaking. The writer prefers the steamed milk to the boiled. It is also more palatable.

Taking the average breast milk as the safest standard, we are impressed with the fact that the helpless young animals and the young of human beings are carnivorous; also that although a vegetable diet would oftener seem far the easiest method of procuring nourishment for our young infants, yet nature has persisted in providing an animal diet. We should therefore be very cautious about endeavoring to introduce into our artificial diet a vegetable element, which, as judged by our standard, must be a foreign element.

Milk is the food which our reason tells us should be given to the young infant, and a milk which will approach as nearly as possible to the average human milk. That of various animals has from time to time been recommended as the best substitute for human milk, the recommendation being based on their analysis approaching more or less nearly the composition of human milk. The milk, however, of all animals has to be modified to correspond to human milk; and when we begin to modify, it is easy to change the proportions of the different constituents to a great degree as well as to a small degree. The fact that one animal's milk approaches in its analysis more nearly to human milk than another is not of much significance, other considerations being far more important; and it is most important of all that we should use one which can be obtained everywhere, all over the world, by the

[1] Loc. cit.

[2] Philadelphia *Medical News*, June 21, 1884.

people at large. This at once settles the question that it is the milk of the cow to which we must turn our attention. Cow's milk may differ in its composition from human milk to a greater degree than does the milk of the ass or the mare, whose milk approaches, so far as is shown by analysis, most nearly of all animals to that of woman; but this in all probability is for the reason that cow's milk is so universally used as a food for human beings of all ages.

If the ass and the mare should become domesticated as a food supply to the same extent that cows have been, there is every reason to suppose that their milk might change in its composition, and their comparatively undeveloped mammary glands increase in size, just as has been the case with the cow, an animal which for thousands of years has been used for the production of milk, as is now the case. In fact, in Egypt,[1] where formerly there either was no trade in milk or very little, we find the cow represented on the monuments with only slightly developed udder, a fact of some significance when we remember the well-known tendency of the Egyptians to realistic representations. It is then from public demand, and by breeding, that cows have been made to produce so much more milk than is necessary for the support of their young. Not only quantitative but qualitative differences exist in animals according to the development of their mammary glands; and as Martini[2] has shown, the development of their mammary glands determines the quantity and quality of the milk which produces it. The question of artificial feeding, then, is practically reduced to some modification of cow's milk; for this is the milk which is most easily procured everywhere, and as the milk of all animals must be modified for the human infant, it is as easy to deal with cow's milk as with any other.

A further exemplification that cow's milk is practically the universal source of the artificial food supply for infants in most civilized communities, is the fact that various foods, patent or not, all depend for their basis on cow's milk, and that without this addition of milk they would show but an insignificant percentage of many of the most important ingredients of the food. So, logically, we should not speak of the various foods as such, but merely as adjuvants to cow's milk; and if this is thoroughly understood, it will, in many minds, do away with much apprehension regarding the apparently successful results of innumerable foods which in reality, when given to the infant, are merely a means of modifying the almost universal representative of the artificial foods—cow's milk.

Cow's milk, therefore, should be carefully compared with the standard of human milk, in order that we may know how nearly it resembles it. Table 4 is a comparison of the average human milk and the average cow's milk, the figures representing the later and more reliable analysis.

[1]Stumpf, *Deutsches Archir. fur Klinisch Med.*, January 18, 1882.

[2]B. Martiny, "Die Milch, ihr Wesen und ihre Verwerthing," Danzig, 1872.

TABLE IV.

	Woman's Milk Directly from the Breast	Cow's Milk as Ordinarily Received, about Twenty-four Hours Old
Reaction	Slightly Alkaline	Slightly Acid
Coagulable Albuminoids	Small Proportionately	Large Proportionately
Coagulation by Acids	Not perceptible in test-tube	Marked in test-tube; greatest in pure milk; less with milk diluted with water, and when 1 to 5 is not perceptible
Water	87-88	86-87
Total Solids	12-13	13-14
Fats	4	4
Albuminoids	1	4
Milk-sugar	7	4.5
Ash	0.2	0.7
Bacteria	Not present	Present

We must recognize, however, that infants in general, as represented by those who live in cities and large towns, do not receive their supply of milk at once from the cow's udder, but that the milk, as a rule, is about twenty-four hours old; and it is therefore cow's milk twenty-four hours old that, until further improvement is made in delivering milk, we must compare with fresh human milk, and modify to correspond to it.

Before speaking of the various modifications of cow's milk which are necessary to make it correspond to human milk, it will be well to say a few words about its properties, as represented in table 4.

The reaction is stated to be slightly acid; and this is the case whether it has stood twenty-four hours with ordinary care or whether it is tested directly from the udder. This has been determined by direct experiment, so that practically the same amount of modification will be correct for the first twenty-four or thirty-six hours, so far as the reaction is concerned.

Of the total nitrogenous constituents of the milk, which are classed under the general term of albuminoids, and of which the casein and the albumen are parts, the coagulable albuminoids are proportionately larger in amount in cow's milk than in human milk, so that under the same conditions a larger curd will be formed with the former than with the latter.

Table 5 gives the results of these experiments, which may prove to be of considerable value. (Dr. Harrington and Dr. Townsend.)

TABLE V.

Equal volume of fluid in test-tubes. Ten drops of acetic acid added to each test-tube. Each test-tube inverted slowly three times, so as to insure thorough, equal, and uniform mixing in all.

1. Woman's milk.....No perceptible curd to the eye
2. Cow's milk, raw.....Large curds
3. Cow's milk, boiled.....Same as No. 2
4. Cow's milk, sterilized by steam.....Same as No. 2
5. Cow's milk .....2 parts
   Water .....1 part. } Finer than 2.
6. Cow's milk .....2 parts
   Lime-water .....1 part. } Same as 5.

The albuminoids, as shown in the table, are four times as great in amount in cow's milk as in woman's, while the milk-sugar holds the relation of 7 in woman's milk to 4.5 in cow's milk; the ash, on the contrary, is in woman's milk only 0.2, while in the cow's milk it is 0.7.

In cow's milk, as commonly used for food, we must recognize the presence of bacteria.

The question is now reduced to the different methods employed in modifying cow's milk. This may be done by diluting with water, by concentrating it and diluting it when used, or it may be modified by the various patent foods or by any other adjuvant, such as barley water, lime-water, or cream.

The following table has been prepared to show the analysis of the different modifications as they are given to the infant, and to serve as a reference table to the physician or nurse, who by this means can readily see how near to or far from the standard of human milk they are getting when they decide to use one of these modifications.

TABLE VI.

COMPARISON OF WOMAN'S MILK WITH COW'S MILK AND COW'S MILK MODIFIED.

(The figures are approximate and represent general averages.)

Material	Reaction	Starch	Water	Total Solids	Fat	Albuminoids	Sugar	Ash
Woman's milk.....	slightly alkaline	0	88	12	¾	½	7	½
Cow's milk.....	slightly acid	0	86.8	13.2	4	4	4.5	0.7
Cow's milk, 2 parts ..... Water, 1 part	slightly acid	0	91.20	8.80	2.6	2.67	3	0.4
Cow's milk, 1 part ..... Water, 1 part.....	slightly acid	0	93.40	6.60	2	2	2.25	0.3
Cow's milk, 1 part ..... Water, 2 parts.....	slightly acid	0	95.60	4.40	1.3	1.33	1.50	0.23
Cow's milk, 1 part ..... Water, 4 parts.....	slightly acid	0	97.36	2.64	0.8	0.8	0.9	0.14
Condensed milk, 1 part..	neutral	0	28	72	10	10	50	2.0

Material	Reaction	Starch	Water	Total Solids	Fat	Albuminoids	Sugar	Ash
Condensed milk, 1 part.. Water, 9 parts..	neutral	0	90.31	9.69	1.3	1.35	6.73	0.26
Condensed milk, 1 part.. Water, 15 parts.....	neutral	0	93.92	6.08	0.83	0.83	4.35	0.17
Loefland's sterilz'd milk	acid	0	62.87	37.13	10.8	10.27	13.78	2.23
Loefland's sterilized milk, 1 part..... Water, 6 parts.....	acid	0	94.02	5.98	1.75	1.65	2.22	0.36
Nestle's Food— Albuminoids..... 8.23 Fat..... 1.91 Sugar.....38.92 Ash..... 1.59 Starch.....41.10 — 1. Water.. .....10. — 11	neutral	3.65	91.75	8.25	0.17	0.75	3.54	0.14
Imperial Granum— Fat .....1.01 Albuminoids.....10.51 Sugar.....trace Ash .....1.16 Starch.....78.93 — 3. Milk.....32.1 Water..... 64. — 99.	slightly acid	2.36	92.88	7.12	0.03 1.33 1.36	0.31 1.33 1.64	trace 1.5 1.5	0.03 0.23 0.26
Mellin's Food— Fat .... 0.15 Albuminoids..... 5.95 Sugar .....48.20 Ash ..... 1.89 Starch .....present — 3. Milk .....48. Water .....48. — 99.	slightly acid	present	91.74	8.26	0.004 2.0 2.004	0.17 2.00 2.17	1.44 2.25 3.69	0.05 0.35 0.45
Barley Water, as usually made with Robinson's Barley, contains— Starch.....1.4 Milk .....2. — 3.4	acid	0.47	90.75	9.25	2.66	2.66	3.0	.046
Biedert's Cream Mixture for Infants, 3 mos.— Cream ..... oz. 1 Milk .....oz. 1 Water..... oz. 3 Milk-sugar .....dr. 1	acid	0	91.56	8.44	2.7	1.8	3.8	.014

Material	Reaction	Starch	Water	Total Solids	Fat	Albuminoids	Sugar	Ash
Meig's Mixture— Cream, 14 to 16 % fat.....oz. 2 Milk.....oz. 1 Lime-water.....oz. 2 Sugar-water.....oz. 3 Milk-sugar.....dr. 17¾ — 8 Water, one pint.	strongly alkaline	0	88.35	11.62	3.50	1.21	6.66	0.25
Mixture recommended— Cream (centrifugal), ¼ to ⅓ % fat, diluted.....oz. 2 Milk.....oz. 1 Lime-water, diluted ¾.....oz. 2 Milk-sugar.....dr. 3⅜ — oz. 8 Water.....oz. 3	slightly alkaline	0	88.42	11.58	4	1.11	6.26	0.21

Note.—To prepare one pint of food for use in twenty-four hours: Take milk and cream (20%), as soon as it comes in the morning, and mix as follows: Milk, 2 oz.; cream, 3 oz.; water, 10 oz.; milk-sugar, 2 measures (one measure is 3⅜ drams). Place in a flask in steamer for twenty minutes; then remove the flask from the steamer, and when still slightly warm, add lime-water, oz. j, and place on ice, and give the proper amount at the proper feeding times. (See table 1.)

In considering the preparation of various foods with reference to making them correspond in their analysis as nearly as possible to human milk, the question is somewhat simplified if we recognize the fact that although the percentage of the ingredients of human milk vary under certain circumstances, yet, as has already been explained in an earlier part of this chapter, so far as the age is concerned, in the early months there is so little difference that a variation is as likely to occur between different milks of the same age as in the same milk at different ages, so that we are probably doing wisely not to change the percentage of the ingredients, but as the infant grows older, give a food qualitatively uniform, but of varying quantity.

There is a very large number of patent foods, but they all claim about the same advantage, and closely resemble one another in their constituents and in their endeavor to make cow's milk easily digestible, and also to make their resulting analysis agree as closely as possible with human milk.

Rotch, M. D., has given the following method of preparing food for household use. It is one of the best:—

"We will suppose, by way of illustration, that we are using a centrifugal cream of twenty per cent of fat. (See table.) We dilute this cream one-quarter, and make this diluted cream, containing fifteen per cent of fat, one-quarter part of the whole mixture. It was found by Meigs that the proper percentage of sugar in the mixture was obtained from a solution of milk-sugar seventeen and three-fourths

drams to one pint of water. In the analysis of the mixture I have found that the sugar percentage was, if anything, usually somewhat under seven per cent; so that to simplify the figures, and without running any risk of appreciably changing the percentage from seven, I have added eighteen drams of milk to the pint of water. In the same proportion we find that in every three ounces of water there should be three and three-eighths drams of milk-sugar, and that this three and three-eighths drams should be the amount for every half-pint of the mixture. I then had a tin measure made to hold three and three-eighths drams of milk-sugar, which obviates the expense of having the milk-sugar put up in packages by the apothecary, and is sufficiently exact not to alter the sugar percentage in the mixture. One of the leading apothecaries sells a pound of the highest grade of milk-sugar for fifty cents, and gives with it one of these measures. Any measure which holds three and three-eighths drams will answer. The milk-sugar can be obtained from first-class drug stores. Hence all mothers and nurses can follow the directions in preparing the infant's food."

It is well to remember, also, that the pound of sugar contains seven thousand grains, and that if we wish to have it divided into packages of three and three-eighths drams, and to pay about one dollar and a quarter instead of using a measure and paying fifteen cents, we can order thirty-five packages to be made from the pound, and we shall still have the resulting percentage in the mixture substantially correct. We must also remember that the proportion of lime-water should be one-sixteenth part of the whole mixture, that is, one-half ounce for the half pint.

Rotch found on steaming a mixture of cream, milk-sugar, water, and lime-water in the usual way for twenty minutes, that the liquid had become a light brown color. Dr. Harrington found that the color was due to certain brown products formed by the action of the lime-water on the milk-sugar at a high temperature. This color itself does not alter the value of the mixture; but Dr. Harrington also found that, while at the beginning of the steaming the reaction of the mixture was strongly alkaline, this reaction grew gradually less as the steaming was continued, and at the end of the steaming, the mixture might be neutral. This change in the reaction Dr. Harrington supposed to be due partly to the formation of a compound of lime and sugar, and partly to the fact that on heating lime-water, much of the lime is thrown down, so that, as the object of the lime-water is to render the acid mixture alkaline, this object is defeated when the mixture is sterilized. The lime-water, therefore, should not be added until after the mixture has been steamed and partly cooled.

To prepare food to be used for twenty-four hours, see Figure 9 for ents are given to make up a half pint of the mixture, it is a sufficient method of sterilization. When the proportions of the various ingredi-rule for preparing larger quantities, such as a pint or a quart. The

directions to be given for preparing a half pint of the mixture by this method are very simple, and can be carried out by individuals possessed of a very small amount of intelligence.

Mix as soon as received in the morning:—

Cream[1] (20 per cent fat) . . .	1½ ounces
Milk	1 ounce
Water	5 ounces
Milk-sugar, one measure, or	3⅜ drams

Steam the mixture in the bottle for twenty minutes, after having introduced it by means of a funnel, in order to keep the neck of the bottle dry. The bottle is to be stopped tightly with a cotton plug. After steaming, remove the bottle immediately and allow it to cool partially; then add half an ounce of lime-water, and keep on ice. If in the country where there is no ice, it should be prepared twice in twenty-four hours, and kept in cold water. This is the simplest way of preparing the food, and will probably prove to be the most practicable as well as the most popular; but, of course, it is open to the objection that every time the infant is fed, the cotton has to be removed from the bottle, with resulting danger of contamination of the remaining fluid, which is but slight if the tube is quickly restoppered. Where, however, as in very hot weather, this objection is found to be a valid one, small bottles for each feeding should be used.

A good plan is to have eight or ten flasks, all stoppered with cotton and having their mouths carefully dried, as was directed for the large liter bottle. In this way the food for twenty-four hours can be prepared by one steaming; and as the cotton is not removed until feeding-time, the mixture will keep indefinitely, and need not be put on ice. When this method of preparation is used, the proper amount of lime-water is to be added to each feeding.

There has been much complaining about the preparation of food with cream and milk-sugar; and it will be interesting to examine into the actual expense incurred in using this mixture.

The cost of feeding an infant three or four months old will represent approximately the cost for the most important part of the feeding period, and the one which is the most difficult to manage. This cost amounts to about twelve cents a day, and there are very few parents who are unable to pay this for their infant during the early months of life. The expense of feeding in this way can not be said to be beyond the means of the people at large; so that, although the food and its methods of preparation are the result of scientific investigation as to what is best without regard to cost, the actual daily expense happens to compare well with what we can reasonably demand as the price which the poor should be expected to pay for the nourishment of their offspring.

[1]Ordinary cream from the common herd, which is about as thin as the dealer's machine will make it, is really of very good quality, and we can count on its containing about twenty per cent of fat.

In conclusion, we can fairly say that it is possible in artificial feeding to approach the standard human breast milk much more nearly than is usually attempted, and there is no reason why clinical results should not be greatly improved, if physicians will only take additional time and trouble to follow more uniformly nature's teachings. In all classes of life, a much greater amount of time, expense, and thought is given, proportionately, to the preparation of food for the adult of the family than for the infant. This is a mistake, both from a humanitarian and from an economical point of view; for the infant is much more susceptible to irregularities of diet, with their resulting suffering, than is the adult; and when once the train of symptoms usually called dyspeptic is established, infinitely more trouble and expense are entailed than if more exact methods of feeding had been adopted before the digestion was disturbed. In the early weeks of lactation, after the mammary function has been fully established, where it can be afforded it is well to have a number of analyses made of the mother's milk, and to keep the results as a control-record to act as a guide for the preparation of an artificial food in case, as so frequently happens, something should occur to end the nursing at an early period. It is highly probable that the digestive functions of the individual infant may have certain idiosyncrasies which correspond to some idiosyncrasy in the percentages of its mother's milk; and in case of difficult digestion, where the artificial food, which has been made to correspond with the analysis of average woman's milk, fails to agree, reference to this control record may give the solution of the problem sooner than if we have to ascertain experimentally, by changing in turn the percentages of the different ingredients, in which particular ingredient the idiosyncrasy of this especial infant is to be found. The assistance of the skilled chemist is too little sought after in determining these questions of infantile digestion and nutrition, and in the future must necessarily be made use of if there is to be any advance for the better in the subject of artificial feeding.

Where an infant, then, is to be fed with artificial food, give precise directions as to the time of feeding, the amount at each feeding, and the feeding apparatus which is to be used. See that the analysis of the food corresponds as closely as possible to that of human milk. Give instructions as to the proper temperature of the food. See that the reaction is slightly alkaline, and then if there is any difficulty with the digestion, sterilize the food. If this is not successful, refer to the control-record of the mother-milk, if you have one, and adapt the food to any material idiosyncrasy shown by this record. If no control record has been kept, experimentally try to discover the especial idiosyncrasy of the individual infant by changing the percentage of the fat, sugar, albuminoids, or ash.

The writer has found Harlock's malted milk prepared according to the directions on the label, to be very useful in starting infants in early life. It does not curdle in the stomach like raw milk.

CHAPTER XX.

WET-NURSES.

A physician, and no other one, should assume the responsibility of selecting a wet-nurse. Some experienced practitioners disapprove entirely of the employment of a wet-nurse, because the risks are so serious, and it is so difficult to avoid them fully. The milk must be nutritious, and adapted to the infant; but the risk of the infant's contracting some serious disease must be avoided.

The moral character of the woman must be considered. While most probably her milk can not influence the future moral organization of the growing child, yet her close association with the infant may make a permanent impress on its pliant brain. Moreover, the woman will bear a close and peculiar relation to the family into which she is introduced, and if she has a bad temper, could cause no little unhappiness. She soon learns, or believes, that her services can not be dispensed with, and she may become an unbearable tyrant. If of intemperate habit, she, when in a state of intoxication, may injure the infant either by accident or design, and at that time will furnish milk of an injurious character. Authenticated cases have been reported of convulsions even occurring in infants because of milk altered by a violent temper and mental disturbance. Moreover, a woman of bad temper, or one without due sense of responsibility, may leave suddenly, possibly when the child can not bear the consequent abrupt change in diet. The wet-nurse should be cheerful, active, good-natured, temperate, moral, and of average mental capacity. By preference she should be married; but in this country married women do not often undertake wet-nursing. If her child is illegitimate, it is best that it should be her first child. There is some danger of a wet-nurse exposing herself to the contagion of such diseases as measles, scarlatina, etc., and conveying the poison to the child.

Generally, in America, the woman is entirely separated from her own offspring, and the latter, if living, is placed either in some home for infants, or is given into the care of some woman to be fed artificially, and usually to die. A proper appreciation of the moral obligation involved should induce the parents of the favored child to make due efforts to secure the proper care of the infant deprived of its natural rights. It is also in the interest of their child to exercise this humane act, for a knowledge on the part of the wet-nurse that her child is receiving kind attention, will go far toward securing that mental equanimity which is necessary to the furnishing of a proper amount of suitable milk.

A good wet-nurse should be robust and strong, but not very fat.

A scrofulous woman can not furnish good milk. Existing tuberculosis, or the tuberculous taint as indicated in the family history, should exclude her as a wet-nurse.

A woman who has suffered with rachitis in her childhood should be rejected.

The most important constitutional disease to exclude is syphilis. She must be cross-questioned as to the multiform manifestations of the disease. Inspect the skin, mouth, throat, nasal passages, and see if there is any characteristic cicatrices.

A syphilitic woman can not give milk duly nutritious; and there is almost a certainty that the child will become infected through some syphilitic lesion; it may be of the nipple or the breast, or of some other part of the person, as of the lips, the tongue, etc.

Neither should a syphilitic child be allowed to be wet-nursed, for the infant will probably infect the wet-nurse. In Prussia the latter is punishable by a special law.

The infant should be examined to determine the presence of syphilis.

The hypochondriacal woman should also be rejected. She can not furnish the best milk, and the hypochondria may eventuate in insanity under the strain of lactation and of separation from her own child, or in the case of its death.

All acute diseases, unless trivial in character, whether contagious or not, render the woman unsuitable.

Pregnancy, of whatever duration, renders the woman unfit, because very frequently the consequent alteration in the character and diminution in the quantity of the milk renders it decidedly insufficient and deleterious.

If she menstruates, the milk is usually so altered at the period as to disagree; and a menstruating woman should not be engaged unless it is known that her milk remains good during the period, or the demand for a wet-nurse is exceedingly urgent. It is repeatedly seen that a nursing child is made ill by the milk of its mother taken during the menstrual flow.

Nature has not intended that lactation and pregnancy or lactation and menstruation should co-exist.

There may be abnormal conditions of the genitals. The applicant for the position of wet-nurse may deny the existence of any symptoms of genital disease, yet a skilful questioner may secure the needed information. It will be safer, however, to insist upon an examination. Chancroids and vegetations are positive contra-indications. Gonorrhœal tubal disease is a decided contra-indication, even though evidence of existing vaginal or urethral gonorrhœa can not be ascertained.

Ovarian cyst-bibeo-myomata, or sarcoma, or carcinoma should lead to the woman's rejection.

A protracted lochial flow indicates usually subinvolution, with or

without some other lesion, such as laceration, ulceration, or polyp. Such conditions render the woman unfit in proportion to their effect upon the general health.

The woman who refuses to submit to an examination must be declined. The breasts must be examined to determine their capacity for the formation of milk, and their fitness for giving milk.

The well-shaped breast of the primipara is conical, and does not drag. If a multipara, the breast hangs somewhat downward as a result of previous nursings. A large breast may be merely a mass of adipose tissue of the mammary gland in it. The breast that consists chiefly of adipose tissue diminishes but little in size as the infant nurses, whereas the mammary gland furnishing a good supply of milk becomes decidedly smaller and less tense after the child has emptied it. The latter breast also enlarges and becomes more tense at the expiration of two or three hours. The breasts must be examined for fibroma, carcinomata, and tuberculosis. The contagiousness of carcinomata and of tuberculosis of the breasts through the milk is at least so probable that no risks should be taken. Lancereux describes a diffused and a circumscribed syphilitic mastitis. The diffused form is usually bilateral, and consists of an indolent induration without discoloration of the skin, almost painless, but attended with enlargement of the axillary glands.

The nipple may present syphilitic fissures or ulcerations. Even if the mother should have escaped infection prior to and during pregnancy, she may contract a primary sore on the nipple or breast from a syphilitic lesion of her child, such as a mucous patch of the mouth or a fissure of the lip. Any syphilitic lesion of the breast, whether primary or secondary, the latter especially if moist, is liable to infect the child wet-nursed.

Tuberculosis of the breast not infrequently escapes observation. The most usual forms are the cold abscess and the chronic fistula. A disseminated form exists in which the nodules are of various sizes and are hard to the examining fingers. They are liable to caseous degeneration and softening, or to calcification. In this variety the breasts are but slightly enlarged from the deposits, and may be movable over the ribs. There is a confluent form of mammary tuberculosis in which the swelling is more marked. Nodules can be felt as irregular, somewhat lobulated, and, it may be, immovable masses. Fistulæ are liable to occur. A true miliary form may exist as an early manifestation of mastitis, and cicatrices or indurations, with a history of previous inflammation, render the woman unfit. The nipple should be neither too large nor too retracted. If too large, a feeble child can not draw it.

The quantity of milk furnished may be judged of by the extent to which the breast diminishes in size when the child suckles, and also by noticing the degree of distension at the expiration of two or three hours after suckling. The trickling of milk from the child's mouth, the act of swallowing, and the satisfied manner in which it remains at the breast until falling asleep, after twenty or thirty minutes, aid in

determining the quantity and character of the milk. A healthy, well-developed, and vigorous child of a few weeks, or older, indicates that the milk is abundant and of good quality. Still it must be remembered that a syphilitic child may present the appearance of health during the first few weeks.

Good human milk has an alkaline reaction, is of a dull white color, and has a specific gravity of 1032.

The diet of the wet-nurse should be generous, and any article known to be nutritious, easily digested, and easily assimilated, may be allowed. That diet which tends to the preservation of vigorous health in the woman, will lead to the formation of the largest supply of nutritious milk. An excess of meat must not be eaten, if the accustomed amount of exercise is no longer taken. Such things as occasional flatulence or other evidence of indigestion must be avoided. Tea must not be drunk in excess. Milk taken during meals is advantageous. An increase in the amount of liquids taken tends to increase the amount of milk secreted; but it must be of a nutritious character, such as meat broths, gruel made with milk, etc.

It will rarely be advisable to resort to stimulants.

The wet-nurse should take plenty of outdoor exercise. The sleeping apartment should be well ventilated and not too greatly heated. The normal action of the bowels must be secured, and abundant ablution exacted. The child should sleep in a crib, not with the wet-nurse, and the mother should always be on the alert that the wet-nurse does not give an anodyne in some form to the infant.

CHAPTER XXI.

DIET AFTER WEANING.

Weaning is the period of infancy when the child is deprived of breast milk, and such changes are made in its alimentation as are rendered necessary by its independent existence. The time of weaning can not be fixed at the same age for all infants. Most authorities assert that it should take place between the twelfth and eighteenth months. Under normal conditions the infant should not be weaned before the twelfth month, nor should lactation be continued after the eighteenth month. There is such a general conformity between dental evolution and age, that weaning usually takes place at the evolution of the eight incisor teeth, which is completed at about the twelfth month.

Let us assume that the mother has weaned her child at the twelfth month, and formulate a dietary accordingly.

Mothers usually begin supplementary feeding after the eruption of the lower central incisors, which is during the seventh or eighth month. Very few infants pass far beyond this physiological epoch without it.

During the period of dentition, developmental changes gradually take place in the digestive apparatus which fit the child for an independent existence. The glandular structures become more active, and the muscular tonicity increases, so that at the period of eruption of the anterior molars, the alimentary tract is prepared for semisolid food.

We will prescribe a suitable dietary for a child in health and disease, from weaning to puberty. It will be best attained by making divisions to conform to the recognized anatomical and physiological changes in the child's organism. The following divisions seem, therefore, to meet all the requirements:—

1, twelfth to eighteenth month; 2, eighteenth to thirty-sixth month; 3, third to fifth year; 4, fifth to eighth year; 5, eighth year to puberty.

Most mothers appreciate the value of milk as the chief food for infants during the first year, but very few of them will be convinced of its value as such after weaning. Several months before the child is weaned, it has had, in many instances, some of the farinaceous food and also meat broths. The writer has seen many mothers feed their infants from the family table, and they seem to think it a praiseworthy method of feeding, teaching their child to cultivate a taste for the various foods in early life.

If weaning takes place before the eruption of the molar teeth,

the diet should be milk. If the child is weaned during the summer months, milk should be its only food, although the molars and, perhaps, the canines have appeared. If, however, the child does not seem to derive sufficient nourishment from the milk, it should be given additional food, provided the weather be cool; but always remember that the chief constituent of its diet must be milk. If it seems to thrive on milk alone, it will be advisable to limit it to that, until the eighteenth month. It is the exception, however, when a child will be satisfied with milk until this late period; and if this is the case, some farinaceous element, such as barley-water, may be added. The barley-water should be prepared by grinding a tablespoonful of the grain barley, and adding six ounces of water, and boiling for fifteen or twenty minutes. Salt to suit the taste, after which strain the mixture. This decoction should be made twice a day, and kept in a cool place. It should be added to the milk in the proportion of one to three or one to two. If constipation is the rule, oatmeal may be used, a decoction prepared similar to that of the barley. Arrowroot should not be used, on account of the large proportion of starch it contains. A small quantity of beef juice or curdled egg may be allowed by degrees. To curdle an egg properly, the water must be boiling. Let one quart of water boil, lift it from the stove, then drop the egg in the boiling water, recover the vessel, and set it off on the table; let it stand exactly five minutes; then lift out the egg, break it into a glass, add a pinch of salt and a very little good, fresh butter, or perhaps the child may relish it best without the butter. Excellent beef tea is made by mincing one pound of lean beef, and adding a pint of cold water and ten drops of dilute hydrochloric acid. This should stand for two or three hours, with occasional stirring. It should then be left to simmer for fifteen or twenty minutes, when it will be ready for use. Beef broth is not very nutritious, and it is not recommended. Mutton, veal, and chicken broths are more nutritious, and are useful in many cases. It must be borne in mind, however, that mutton causes constipation, and veal diarrhea.

Cow's milk is that most generally used for feeding infants. The cow should be thoroughly looked after. She may be kept in a badly ventilated and foul stable. She may scarcely even run at large, or browse, and probably her food will be mainly swill; though even without exercise or browsing, if fed on long food and brans, with an occasional feed of fresh grass, she may furnish a good quality of milk. Again, the cow may be a sickly one, but the milkman will not let it be known so long as he is receiving his price for his milk. If we are sure of getting good, sweet milk, twice a day, from properly-fed cows, let us be satisfied. Probably a great many more children would be saved if more attention were paid to the preparation and dispensing of milk.

Unmethodical and irregular feeding is quite as bad as feeding with improper aliments. The child should be fed regularly with

enough milk to satisfy its appetite; but giving it food to appease its anger should be positively prohibited. It should be remembered that fretful children are usually thirsty, and it is water they crave rather than food at irregular intervals. The quantity must necessarily be increased as the child advances, but due regard should always be paid to its digestive and assimilative powers. Overloading its stomach impairs its digestion.

The most satisfactory result is obtained in securing good, sweet milk from a country dairy, delivered twice a day, if possible. As soon as it is delivered, pour on the requisite amount of boiling water to scald it; then put it in a refrigerator to be used when required. If there is no refrigerator, as is so often the case, it must be kept in a cool place after cooling it first by placing the vessel in cold water, keeping the milk covered with a clean cloth. Until the fifth month, at least, the milk should be given from a bottle to insure steady feeding; after this it may be given from a cup or a glass.

Do not permit the bottle to be used as a soothing apparatus; when thus employed it does harm. Never let the child sleep with the nipple hanging to its lips. It should not be fed oftener than once in four hours. With every feeding add a teaspoonful of lime-water, or from one-half to one grain of bicarbonate of sodium. When it is through feeding, throw away the remaining portion, never allowing it to stand in the bottle. Scald the nipples, tubes, and bottle, and keep them in a solution of soda until the next meal. The simplest and most convenient way of cleansing the bottle is with scalding water with a little baking-soda in it, then rinse with scalding water.

Of the various substitutes for breast milk, condensed milk is probably the most extensively used. Very many use it because they can not afford cow's milk, and can not spend the time necessary for the preparation and preservation of cow's milk, and consequently feed their children on this unstable article. The weight of authority is against the use of condensed milk, owing to the lack of nutrient ingredients. Children fed with it will grow, but are deficient in muscular vigor. Under some circumstances we may be compelled to use it. During very warm weather, when poor people can not buy ice to keep cow's milk, it may be advisable to use it; but its use should never be sanctioned when good cow's milk can be secured. In the country, the cow can be kept in a pasture near the house, and the milk can be taken from the udder three times a day during the hot season of the year.

Rotch, in a valuable paper,[1] discusses the merits of the different "infant foods," and demonstrates their unreliability as substitutes for milk.

With sixteen teeth the child should be allowed a more liberal diet. Its digestive apparatus is now capable of digesting food which has been masticated. It may be allowed to have stale, well-cooked bread two or three days old, and butter, or crackers. It may also be given a little

[1] "Archives of Pediatrics," Vol. 12, No. 44, p. 458.

mashed, mealy white potato, well whipped, with gravy. A sandwich of scraped lean beef cooked slightly and quickly, seasoned with a little salt or a pinch of sugar, will be relished, and is very nutritious. It may have a chicken bone to suck, care being taken that it does not swallow the pulp or bone.

In regulating the regimen of a healthy infant during this period, very little change is required in its food. It should be fed five or six times at the same hours every day, but should not be awakened for this purpose. If it desires its food before its accustomed time, it should have it.

First meal, 6 A. M.—A cup of milk with cream biscuit or a slice of buttered bread—not stale butter.

Second meal, 8 A. M.—Stale bread broken and soaked in a tumblerful of rich, fresh milk.

Third meal, 12 M.—A slice of buttered bread with about a half a pint of weak beef tea, or mutton or chicken broth.

Fourth meal, 4 P. M.—A tumblerful of milk with crackers, or a slice of buttered bread.

Fifth meal, 8 P. M.—A tumblerful of milk with bread or crackers.

Toward the latter part of this period, when the child has sixteen teeth, it may be desirable to substitute the following:—

First meal, 6 A. M.—Bread or crackers with a half pint of milk.

Second meal, 8 A. M.—A tablespoonful of well-cooked oatmeal, cracked wheat, or corn-meal mush, with milk, and a couple of slices of buttered bread.

Third meal, 12 M.—Bread and butter, milk, soft-boiled egg.

Fourth meal, 4 P. M.—A piece of rare roast beef to suck; mashed boiled potatoes, well whipped and moistened with dish gravy.

Fifth meal, 8 P. M.—Milk and bread and crackers.[1]

This is a modification of the diet laid down by Louis Starr; but Adams, M. D., insists that the infant should be confined to milk, milk and barley-water, or milk and oatmeal-water, during this entire period. He claims that when his advice has been followed, the perils of the "second summer" have been avoided.

A sensible mother can easily choose from the above diet such changes as her child relishes, and also such as agree with it.

Fruits and berries of all kinds should be interdicted.

Every case of infant feeding must be regulated by its own indicated requirements. There is no uniform rule applicable to all. Each must be studied carefully, and that mode of feeding must be adopted which proves best suited to it. The child should not be permitted to sit at the family table, provided it is tempted by unwholesome dishes. Some children will accept their proper food, where others will not.

The diet in sickness, during the first period, must be regulated

[1]Often it would be preferable to give the fourth meal at 3 P. M., and the fifth meal at 6 P. M., especially in winter, so that the child can be put to bed by seven o'clock.

by the nature of the case. It is impossible to prescribe a regimen suitable to all sick children.

Vomiting is the most frequent symptom to be controlled. It may be due to overfeeding, or to some fault in the quality of the food. When it is caused by overfeeding, a diminution in the quantity of food, as well as a longer interval between meals, will usually correct it. If it should be caused by a defect in the quality, this should be discovered and remedied. If the ejected matter is sour-smelling, the alkali must be increased. Frequently forced abstinence will correct it; and in many cases small quantities of food given every fifteen minutes, or every twenty or thirty minutes, will have a salutary effect.

Diarrhea is often the result of improper feeding. The food may be too concentrated, or its quality may be poor. When it is due to too much solid food, the indicated treatment is to confine the patient to a liquid diet. If the quality of the food is not good, it should be improved. In many cases the addition of barley-water to the milk will prove effective in checking the diarrhea.

Constipation may often be corrected by adding oatmeal to the second meal, or oatmeal-water to the milk, prepared the same as barley-water.

It should be the invariable rule to confine children to a liquid diet as soon as any impairment of digestion or assimilation is noticeable or they become ill. Milk should always have the preference. It may be given pure just from the cow, or diluted, boiled, or perhaps predigested in some cases. In rare instances milk will not be retained by the stomach, or will be passed from the bowels only partially digested. In such cases a mixture of equal parts of milk and lime-water, given in teaspoonful doses every ten or fifteen minutes, will frequently be retained and digested. In some cases where milk can not be retained, barley or rice-water may be temporarily substituted. In other cases beef tea, beef essence, or beef juice may be administered in small quantities, frequently repeated, with marked benefit. Tea and coffee should not be allowed.

To weakly children the following may be given:—

Chicken Jelly.—Clean a fowl that is about a year old, and remove the skin and fat. Chop it, bones and flesh, and put it in a pan with two quarts of water. Heat slowly and skim often and carefully, letting it simmer for five or six hours, when add salt and mace or parsley to taste, and strain, and set away to cool. When cold, skim off the fat. The jelly is usually relished cold, but may be heated. Give this in small quantities very often.

Wine Whey.—Boil three wineglasses of milk, and add a wineglass of sherry or port wine. Strain and add a wineglass of warm water. A wineglassful of this may be given once or twice a day.

White-Wine Whey.—To half a pint of boiling milk add a wineglassful of sherry; strain through a fine muslin cloth, and sweeten to taste. A tablespoonful of this may be given every two or three hours.

It is quite as important to regulate the diet during the second period as during the first, but much more difficult. At this period the child is walking, and often helps itself to indigestible substances. It now has all its milk-teeth, and is capable of mastication. Its mind is generally sufficiently active to be taught what edible articles it should have. Its power of mastication, its flow of saliva, its good digestion and assimilation, and its increasing growth, demand a greater variety of food. If it reaches the second period during the summer, and has the appearance of health, and seems satisfied with its milk, egg, and simple food, it will be prudent to wait until cool weather before changing its diet to a more substantial kind.

It is now admissible to allow it to eat at the family table, because the opportunity to begin its training early should not be overlooked. It can now be taught to eat slowly; that certain articles are not suitable for it; and that it can have enough of the proper kind of food. When a child frets for different articles of food on the table, it is generally because some imprudent person has allowed it to taste them. If it is not tempted by tasting other foods, it will be contented with its own simple food. It should be fed at least four times daily, and will occasionally require a few crackers or a slice of bread and butter between meals.

SECOND PERIOD: EIGHTEENTH TO THIRTY-SIXTH MONTH.

First Meal, 8 A. M.—A portion of well-cooked oatmeal, wheat engrits, or corn-meal mush, with a liberal supply of fresh milk, cold bread and butter, and a piece of finely-cut, tender beefsteak, or a soft-boiled egg. The better plan is to give the egg first, then the mush and milk, etc.

Second Meal, 12 M.—A bowl of chicken or oyster soup or weak beef tea; milk, with bread or crackers and butter.

Third Meal, 4 P. M.—Roast beef, mutton, or turkey; fresh white-fish, mashed white potatoes moistened with gravy; bread and butter, and rice and milk.

Fourth Meal, 8 P. M.—Milk, with bread or crackers.

It may be necessary to give a glass of milk and a piece of bread between the first and second meals; and if the child is particularly hearty, the same may be occasionally required in the early morning. Toward the latter part of this period fresh ripe fruits are admissible, provided due care is taken to prevent the ingestion of seeds and rinds. A popular fruit is the banana, but it should be allowed only very sparingly, as it is more likely to be productive of eclampsia than almost any other fruit.

In the country, children's diet has to be regulated according to the local custom. Their heartiest meal is at 12 M. The lightest meal is at 6 or 7 P. M. Hence, the child will require a piece of bread and butter or a tumblerful of milk about 4 P. M. The child will need constant watching to prevent it from obtaining unsuitable food. Frequently

the neuroses, as eclampsia—"night terrors"—and the numerous symptoms attributed to worms, may be directly traceable to the presence of indigestible food in the alimentary tract. Early in the morning, give the child a large tumblerful of fresh milk just from the cow. After an hour or so, give a brisk purgative, such as sulphate of magnesia, or a dose of castor-oil, to move the bowels briskly, and if there are any worms you will generally see them. The removing of the excessive amount of indigestible food will have a salutary effect on the nervous system.

When the child is suffering from acute disease, its diet should be limited to milk and beef tea. In chronic ailments or in protracted convalescence from acute disease, each case must be treated according to its individual requirements, while good judgment will render valuable assistance in the selection of those foods which are easily digested, and which possess the maximum quantity of nutritious matter to the quantity ingested. Do not give a sick child tea and toast; it only loads the stomach with innutritious matter.

In the country, chicken, eggs, and fresh milk are always obtainable in the summer season, because of the hot weather. Chicken-jelly and eggs will take the place of beef juice and beef tea.

THIRD PERIOD: FROM THE THIRD TO THE FIFTH YEAR.

During this period the difficulty of regulating the child's diet will be very great. It has now reached the age when its friends will humor it with knickknacks and table food of difficult digestion. It has twenty teeth, and its friends can not understand why it should not have such food as a healthy adult can digest. A devoted mother will reason thus, or usually a grandmother will argue that all her children at this age were fed from the table, and were not injured. Such children lived in spite of mismanagement. Granting that the child's diet must be more liberal at this age, it still must be restricted, for even now the presence of indigestible or undigested food in the alimentary tract may be productive of reflex nervous disturbances.

Its activity and waste and repair demand an increase in the quantity of nutritious food. Three substantial meals a day will usually suffice, with occasionally a piece of bread and butter between meals. If the child is hungry between meals, it should not be made to wait until the next regular meal, as it may suffer from hunger. A "snack" is necessary for the welfare of the child. The practise of children running to the pantry between meals should not be allowed. Let the mother or nurse give them the necessary amount to obviate hunger till the regular meal-time. Where children are allowed to help themselves from the pantry between meals, they do not eat enough at the regular meals.

It is impossible to lay down a "bill of fare" for this period, but a frugal meal can be selected from the following:—

Breakfast.

Corn-meal mush, oatmeal, wheaten grits, hominy, with *plenty* of cream. Potatoes, baked or stewed.

Eggs, poached, soft boiled, or an omelet.

Fish, fresh broiled.

Meats, beef hash, broiled steaks, stewed liver, lamb chops, and chicken fricassee.

Tomatoes, sliced (occasionally).

Bread, cold, light; graham gems (occasionally); corn and rice cakes, with a little syrup.

Fresh ripe fruit may be given in moderate quantity.

Highly-seasoned food must be avoided.

Luncheon.

Soups: Oyster, bean, chicken.

Vegetables: Potatoes, baked or stewed; sliced tomatoes.

Meats: Beefsteak, lamb chops, cold lamb, or mutton.

Bread: Cold rolls and soda crackers.

Fruit in season.

Rice and milk.

Dinner.

Soups: Noodle, oyster, cream-barley, potato, chicken, or chicken stew.

Fish: Fresh, baked, boiled, or broiled.

Meats: Beef, chicken, lamb, or mutton.

Vegetables: Potatoes, cauliflower, peas, tomatoes, and beans.

Bread: Wheaten, well-cooked.

Desserts: Rice and milk, light puddings, ice-cream (occasionally).

Fruits and berries in season (fresh and sound).

Desserts for children after two and one-half years may be: Plain custard, ice-cream (not oftener than once a week), rice pudding (no raisins), baked apples (with or without cream), stewed prunes, molasses ginger cake, currant or apple jelly.

The regimen of the sick during this period does not differ very materially from that of the preceding, except that, generally, a more generous diet may be allowed. If the illness is of a nature demanding liquid food, the principle already set forth will be applicable. In cases of illness the food should be reduced in quantity and changed in character, although the patient may not be confined to liquids. As soon as the appetite becomes impaired, the child should be put upon a simple diet. Frequently, in children of this age, too much deteriorated fruit will cause digestive disturbances. Withholding the fruit a few days will effect a cure. The child should always have its fruit selected for it, and it should be of the choicest quality. When sick, knickknacks and fancy dishes should be forbidden. If the illness be protracted, and the food be digested and assimilated, it should have the most nutritious aliment. This rule is especially applicable to scrofulous, syphilitic,

rachitic, and tuberculous children. We need not wait for a manifestation of these diatheses. If there is good reason for suspecting their presence, the sooner the select diet is begun the better; and, even if they are not latent in these children, the care in feeding will prove beneficial.

New troubles seem to arise during the fourth period which require close vigilance over the child's dietary. This period extends from the fourth to the eighth year. At this time the milk-teeth begin to decay, and the first of the permanent teeth make their appearance. The child has frequent attacks of toothache, the dread of which prevents it from properly masticating its food. Consequently, indigestion and diarrhea, from bolting food, are of frequent occurrence.

Again, the child is old enough to be indulged by its parents in everything they eat; hence, the possibility of restricting the diet as long as it is healthy.

It is advisable to select its food from the articles recommended for the third period, with the addition, perhaps, of game, corn, string-beans, sweet potatoes, Lima beans, hot bread and cakes, and light custards and puddings. In sickness, the general rule of restricting the diet according to the nature of each individual case is also applied.

The physiological changes which take place during the fifth period, which is from the eighth year till puberty, would warrant the statement that the most extraordinary care should be exercised in regulating the child's regimen.

The ingestion of too highly-seasoned or too rich food, it is said, may unduly excite the passions and pervert the physiological phenomena of boyhood and girlhood. It is also apt to cause lascivious dreams, and probably sexual excitement.

The rules governing the dietary during sickness are similar to those for adults.

The use of wine and beer should be entirely prohibited, and that of tea and coffee discountenanced.

In discussing the diet for children, some regard must be paid to the important factor of the circumstances of life. In presenting a regimen of diet which has stood the tests of the laboratory, we must remember that such advice is given to a large number who are not able to incur the necessary expense of typical feeding. To prescribe such food as that heretofore mentioned, and recommend it for the child of the laborer whose wages are scarcely adequate to support his large family, would entail hardship on those whose affections are strongest for the weak and afflicted. The expense necessary to obtain cream, milk, and milk-sugar will not be considered by people of even moderate circumstances; but it will be difficult for the mechanic, and impossible for the laborer. Therefore, it is important in selecting a food for children, either well or ill, in the lower walks of life, to recommend that which will be healthful and of reasonable cost.

If the following good advice is impressed upon the mother or nurse, the success of treatment may be greater:—

"Never give recooked meats, fish, or vegetables to an invalid, and cook only small quantities for the child. Simplicity, variety, and healthfulness are the things to be considered in preparing food for the sick. The vessels that the food is cooked in should be thoroughly clean. What is good for one person is frequently injurious to another. One must not become impatient or discouraged because the invalid is changeable in his tastes."

The eye as well as the palate of the patient is to be considered. The tray should always be covered with a fresh napkin. The china, glass, and silver should be the daintiest the house affords. Only a few things should be served at a time. It is better that the patient should think that he has not had enough to eat than that he should lose his appetite on the appearance of too large a quantity of food. The patient should be served first, and not be made to wait till the family have finished.

CHAPTER XXII.

NURSERY HYGIENE.

Nursery hygiene in its full sense includes the same topics and covers the same ground as does general hygiene, with such variations as to details as are required by the ages of the occupants of the nursery.

The subject of the new-born will be discussed in the chapter on maternity. The feeding of the young and dentition are discussed under their respective headings. This present chapter will be restricted to suggestions concerning the nursery itself, its situation and surroundings, its warming and ventilation, nursery nuisances and their avoidance, the dress, bath, and toilet of children, and care of their food. We will quote from different authors, adding our own experiences.

While it is true that as regards many of these topics medical advice is rarely asked, it is also true that to the mass of persons the family physician is the only sanitary authority, and that by opportune suggestions he may do much, in the aggregate, in the way of prevention of disease. However much such guidance may be necessary in general, it is still more imperatively demanded in nursery matters, owing to the exaggerated susceptibility of young children to the depressing influences that affect their development. It seems proper, therefore, to call attention, even at the risk of insisting upon truism, to details which are often relegated to the discretion of nurses.

Of course no nursery can be thoroughly healthful unless the house itself is such,—is well placed upon good soil, and so constructed in detail that the rules of sanitation have been consciously or unconsciously considered. These rules we can not discuss. It will be assumed that the house is as well situated, as well drained, as well built, and as well lighted as the means of the owner will allow. The details which follow are such as will assist in making the nursery the most healthful part of a good house, and as wholesome as practicable in a defective one.

In selecting a room for a nursery, that one should be chosen which is the sunniest, best aired, and driest; and in deciding between two or more houses in other respects eligible, distinct preference should be given to that one admitting of the best arrangements for nursery purposes. In houses where no room is to be set apart especially as a nursery, and children are to occupy the general living-room by day and the parents' bedroom at night, the same rules should govern the selection of these rooms, the sanitary benefits in such case accruing to adults and children alike. When possible, it is preferable to place the nursery above the ground floor, unless the latter is unusually well raised from

the ground; but it should not be immediately under a roof, on account of the difficulty of regulating the temperature in such a situation.

Every one should know the beneficial influence of sunlight. Its healthfulness needs no insisting upon. Nevertheless, it is constantly overlooked. The nursery should, if possible, look to the south, or as nearly so as the situation of the house will permit, with a morning exposure in preference to an afternoon sun, if but one can be had. The windows should be ample in size, and more than one if possible, as they not only serve for the admission of light, but in the ordinary dwelling are the only means of ventilation. The sensibility to the loss of sunlight seems to vary somewhat with adults, but we believe that all children suffer from its absence, and the daily complete sunning of the apartments should be insisted upon.

In summer, even, it is usually better to have the sun and to mitigate its power at proper times by means of awnings and blinds, than to have a room upon which it does not shine. There may be circumstances of climate or of prevailing winds which will modify this rule, but it holds in general. The room should be of ample size, particularly if it serves, as is the rule in ordinary houses, the double purpose of night and day nursery. "The precise amount of space required for each child will vary with the arrangements for ventilation; but not less than fifteen hundred cubic feet of air per hour should be allowed, and preferably double that amount."

As only in the houses of the wealthy can a room be specially set apart as a sick-bay or a hospital, the nursery must ordinarily serve that purpose whenever illness occurs. For this reason, as well as for others, the furnishing of a nursery should be as simple and as easy of cleaning as possible and be consistent with comfort. The floor should be of smooth, closely-jointed boards, preferably hard, close-grained wood. The seams, if they open by shrinkage, should be closed, either by relaying, or by calking well done. Poor calking is worse than useless, and any calking is inconvenient in rooms the floor of which must be raised to reach gas or water-pipes, as is unfortunately the case. Carpets are necessary to comfort, but movable carpets or rugs are far preferable, as permitting more frequent cleaning both of the carpet and floor. In a warm climate a bare floor is still better. It may be painted and varnished. At the present time even cheap grades of carpet are made in rug form, or the desired pattern can be made up with tasty borders without much expense. In cases of actual illness of a contagious nature, the rugs may be taken away at once, and their contamination be prevented, which, in view of the difficulty of subsequent disinfection, is very desirable. The same precaution against dangerous dirt leads to the preference, for the nursery, of painted and varnished walls to those papered, even at the loss of some beauty in the apartment. If paper is strongly insisted on it should be of a kind that can be thoroughly varnished, and will admit of being washed, and all old paper must first be removed before new is laid.

The furniture of the room should be as light as is consistent with serviceability, in order that the pieces may be easily moved from place to place to admit of frequent cleansing; and for the same reason every bulky or heavy article should have large and strong casters. It is further desirable that all furniture should be as plain and simple as possible, carved wood and thick upholstery stuffs being objectionable as receptacles for dust. Taste may be gratified without violating this requirement. Further, all cupboards, closets, and similar places of deposit should be as open to inspection as possible, in order that offensive or untidy things may be easily detached and removed. On account of this facility of examination and cleansing, the writer usually prefers shelves with movable curtains in front, to closed cupboards and deep drawers. The deep drawers are suitable enough for clean linen, but are a temptation to careless attendants to indulge in "tuck-away neatness."

Warming and ventilation will only be touched upon in this article. If the nursery is in a house with a good system of heating and ventilating, nothing in particular will be needed except a grate or a stove for use in emergencies. Ordinarily, however, even houses which have a fairly good furnace or other heating apparatus have no specific arrangements for ventilation beyond what are afforded by the windows, chimneys, and imperfections of structure. The ordinary methods of warming in use in this country are open fires, stoves, and furnaces. The hot-air furnace, if properly constructed, is quite satisfactory. Its commonest faults are the delivery of too small a quantity of air at too high a temperature (a larger quantity at a lower temperature being preferable), and such arrangements of its cold-air flue that the supply is from an impure source. The former difficulty is overcome by having the furnace considerably larger than necessary, and by keeping the fire moderate. The latter, by using a tight metal flue, the outer end of which is free from unwholesome surroundings, and properly raised some feet from the ground, by which means some of the foul air of dark city back yards or of the gutters is avoided. The same precaution is of use in many country houses. The outer end must be protected by wire screen to prevent mischief being done by children or small animals. If the screen is fine-textured, it will diminish the amount of dust drawn into the house. For a nursery, it is of advantage to have the registers for warm air rather high, as this arrangement makes a better general circulation of air, diminishes the intensity of floor draughts, and renders meddling with the register by small children more difficult.

The open fireplace has for advantages cheerfulness of aspect and a fair amount of ventilating power; for disadvantages, great wastefulness of fuel in proportion to its heating power, so that ordinarily, when this is the only source of heat, great differences of temperature exist in different parts of the room. If the neighborhood of the fire is comfortable, the remote parts are cold. Further, it ventilates by the production of draughts, particularly floor-draughts, which are especially

dangerous in the nursery, where little children spend so much of their time upon the floor. The wood fire is very beautiful and useful when a short, quick heat is needed; but aside from its costliness it is not so good for heating as a steady coal fire. In a nursery, any open fire must be guarded by a strong wire screen, to prevent accidents from sparks, or from the clothing of children taking fire. Stoves of the ordinary closed variety, the "air-tight," are very economical of fuel, but nearly useless as ventilators, and, if used, make especial watchfulness as to ventilation necessary. The ventilating stoves, which are the offspring of the old Franklin, make a compromise by which all the ventilating value of the open grate is preserved with less waste of fuel, about three times as much of the heat value of a given amount of fuel being utilized by these stoves as by the open fire. The principle of construction in its simplicity is to surround the stove and its smoke flue for some distance with an air chamber; to this chamber is admitted air, preferably from out-of-doors, and as it is warmed it is poured into the room at a higher point, for instance near the mantel. As regards all stoves, it is perhaps safer to have no damper in the smoke flue, or else to fasten it so that it can not be closed without difficulty, since by doing so the danger of gases of combustion being forced into the room is removed.

The stove used in barracks seems to be well adapted for nursery use. It is surounded by a jacket of sheet-zinc or iron, with the necessary doors, leaving space between the stove and the jacket. This should come to the floor, and the cold air be brought from out-of-doors to within the jacket by means of a small pipe, the warm air escaping at the top of the jacket. For the nursery the jacket has the advantage of being a safeguard against burns, at least against severe ones.

The getting rid of foul air is a more difficult problem, especially with stove heat. An open window with the double current, that is, down from the top a short ways, and up from the bottom, the "elbow ventilator" placed under the lower sash, is well known; so are various wire screens, either vertical or rotating like a transom. These do fairly well under favorable circumstances, but are rarely sufficient when air-tight stoves are used. If in the construction of chimneys a ventilating flue is included, or if the smoke flue is inclosed in a space which may serve as a ventilating flue (as, for instance, a stovepipe running up within a chimney which has a fireplace at the bottom), it is easier to ventilate a room. If the chimneys are already closed in, the cheapest and at the same time an efficient method is to have an air flue leading from near the floor into the chimney higher up. The upward current of air in the latter draws the air through the ventilating shaft. It is more efficient if placed near the stove, so that the air within it is heated and its upward movement hastened. Its mouth is placed low so as to save unnecessary waste of warm air.

It should be remembered that artificial lighting by lamps or gas rapidly spoils the air in a room for breathing. Lighting capacity is

usually measured in candles, and an average adult produces rather less than twice as much carbonic acid as one candle. A large kerosene lamp or a gas-burner often equals the production of five or six adults. It is very desirable, therefore, if a night-light is necessary in the nursery, that its carbonic acid be got rid of, and by the device often used for ventilating purposes, of putting the burner or lamp within or beneath a tube or flue going to the roof or chimney, the result of combustion is carried away, and an outward current of small power is also established. By having at the bottom of the flue a box, with a door, to contain the light, the latter may be shut off partly or wholly except when needed.

As to the temperature of nurseries, authorities are not quite agreed. We believe that if a room can be uniformly heated 65 degrees Fahrenheit, it will be found, on the whole, more comfortable and healthful than the usual 70 degrees Fahrenheit, which latter should not be exceeded. At night the temperature should not be allowed to fall too far below the day standard, and special pains should be taken to guard against the uncovering of children in bed.

A word concerning windows. As is well known, the loss of heat from the cold glass is very great. Mr. Hood puts it that by each square foot of glass more than one and a quarter cubic feet (1.279 cubic feet) will be lowered each minute as many degrees as the difference between the internal and external temperatures. If, for instance, the thermometer outside showed no colder than freezing temperature (32 degrees Fahrenheit), and within no higher than 67 degrees Fahrenheit, the discrepancy would still be 35 degrees. A window three feet by six feet would expose eighteen feet of glass surface, and according to this rule, it would cool each minute 18x35x1.279, equals 805 cubic feet, one degree, or about two hundred cubic feet four degrees. This makes a constant current of cold, descending air near a window, very sensibly felt by any one obliged to work in such a place in cold weather. It is important, then, that children should not play near a window in cold weather, and a low article of furniture may often be so placed as to keep them away without the trouble of constant oversight. The ingenuity of the attendant will similarly devise means of keeping them from sitting on the floor if it be draughty.

Besides the admission of pure air and the discharge of foul air, purity of atmosphere demands that no nursery nuisance be allowed to exist. It is better that no plumbing of any sort should be in the room itself. Bath and closet conveniences are very necessary, but should be a little removed and well ventilated. In houses that are not plumbed, a place to which all offensive or soiled articles can be directly removed should be provided, which place should have free ventilation. All soiled napkins, and vessels containing evacuation or urine, should be promptly removed, and in case of sickness a vessel should be provided in which the napkins or stools can be disinfected.

Under ordinary circumstances, however, disinfectants, in the usual sense of the word, have no place in the nursery nor in hygiene generally. A place that can not be made wholesome by sunlight, air, and cleanliness should not be occupied. Whenever emergencies demand their use, and after a contagious illness, only the more costly contents of the nursery should be disinfected; the cheaper ones can be burned with a greater ultimate economy. For this reason the toys should be of the cheaper variety, particularly if of such a kind as readily to conceal supposed sources of contagion. The painting of walls and ceilings, and the closely-laid floor, already urged, are of great assistance in promoting efficiency of disinfection.

Toilet.—The bath has many uses as a remedial agency, both in lessening temperature and in quieting nervous irritation of various sorts. It is here considered only in its hygienic uses as a part of the toilet. The object of baths thus employed is simply cleanliness and the aiding of the proper functions of the skin, with practically little intent to produce the stimulating effect incident to the cool morning bath. Such a bath needs to be of a moderately high temperature; that is to say, not very much below the usual skin temperature, so that no great effect shall be had upon the general system. By using warm water, moreover, a smaller amount of soap and friction is necessary for cleansing, both of which in excess tend to irritate the delicate skin of the infant. Only the best, purest, and blandest soaps should be used. While undue coddling is to be avoided, all "hardening" or "toughening" regimen is distinctly pernicious in infancy, and should be used with judgment according to individual constitution throughout the developmental years. The power of a bath at a given temperature (according as the effects of a hot bath or a cold bath are sought) is much greater when the body is immersed than when it is sponged for the same length of time. For this reason, in children at all feeble, the immersion should be brief or omitted altogether. The bath should never be allowed to become a domestic fetish, but its object should be kept in mind, and its results noted. For young infants in ordinary health, the method of administration followed by intelligent nurses is entirely satisfactory. The bath-tub contains water at about 95 degrees Fahrenheit, which may cool a few degrees during the operation. The child, lying upon the bath-blanket spread upon the nurse's lap, is sponged with soap and warm water, particular attention being paid to those parts most likely to have sebaceous accumulations or to be otherwise soiled, such as the scalp, armpits, groins, and seat. This done, the child is dipped into the bath for simple rinsing, laid in its blanket, and dried with it without rubbing. As it grows older, its back is supported by the hand of the nurse, and it is allowed to frolic in the water for a few minutes, the exercise of kicking and its pleasure insuring a healthy reaction after the bath. If a child is alarmed at its bath, the immersion should be omitted or be very brief, as fright will counteract any benefit from the immersion, and may often be accepted as evidence that from

some cause the procedure is unsuitable. If it enjoys the bath, its immersion may be gradually prolonged, and the temperature somewhat diminished, say to 85 degrees Fahrenheit.

Toilet powders are not necessary. Their purpose is only to dry the skin. (However, the powder feels comfortable.) This is better done by careful pressure with soft cloths with little friction. If irritation exists around the seat or in the groins, or in other places where moisture is usually excessive, powder is useful. We prefer mineral to vegetable powders, on account of their freedom from fermentive changes. Powdered talc we think the best.

If a cold bath is to be used for its stimulating effect upon a young child, before the full bath, the bath by affusion should be tried, the child standing in a tub while water is applied by squeezing it from a full-sized sponge.

The shower and douche-bath have no place in the nursery except as therapeutic resources.

Neither the indoor nor the outdoor bath should be given soon after a meal, nor when the child is really hungry. In the one case indigestion is likely to follow; in the other, the shock of the bath is not well reacted from.

For very young children, sea bathing, unless ordered by your family physician as a remedy, is rarely desirable. As soon as the child is old enough to comprehend the method, it should be taught how to swim.

The care of the hair in infancy consists chiefly in the care of the scalp, which must be kept strictly clean. A soft brush should be frequently used upon the hair; a comb only as a separator for parting the locks and in emergency for disentangling. The teeth require the same care as in adult life, but brushing should be of the gentlest sort, for fear of irritation of the gums, which may cause their subsequent retraction. In infancy, after each feeding or nursing, the gums should be washed to prevent the formation of aphthous growths, and the teeth treated likewise as they appear. When the child is old enough to be quiet while the cleansing is done, a soft badger-hair toothbrush should be used.

Dress.—The hygienic essentials of dress are sufficient warmth without burdensomeness, uniformity of protection as far as consistent with activity, freedom, and, for children at least, softness. Woolen garments are preferred, because of the warmth without undue weight. Owing to the poor conducting power of wool, such garments retain the heat longer than those made of other materials. This slowness of conduction is greater in loose-textured fabrics. That is to say, a given weight of wool is warmer if loosely than if tightly woven. Hence, the warmth of knitted garments. The difference is due to the retention in the interstices of a certain amount of air, which is a poor conductor. For the same reason, two garments, two shirts for instance, are warmer than one shirt of equal weight to the two; and loose-fitting garments

are warmer than tight ones. In hot weather, however, tight-fitting garments are distressing for other reasons.

Linen stands at the other extreme of ordinary dress material, being the best conductor of heat. It follows that woolen garments give the best protection against the change of temperature and chilling; and in proper weight they make the safest dress in all places where the temperature may vary, or for all children who may become heated in play. Fashion or taste usually calls for outer garments of linen, but the protective garments should be beneath. The absorption from the sun varies much according to the color of the garment, the material and texture being unchanged, white taking the least heat, or being the coolest, while black will absorb about twice as much. Singularly enough, the "cool-looking" light blue is found, by experiment, to be nearly as hot as black. For very young children, who are little exposed to the sun's heat, this question of color is of minor importance.

Softness of material is essential for children on account of the sensitiveness of their skin. To most infants, fine, soft woolen shirts, either knitted or of baby flannel, are seemingly entirely comfortable. Some, however, manifest unusual irritability of skin, and such a shirt of fine linen should be placed within the flannel. This precaution is more often necessary in hot weather, when the flow of perspiration is increased.

The ordinary dress for very young children is objectionable in several ways. It is usually unnecessarily confined about the body and limbs, although it has never in this country reached the degree in this respect that seems to be usual in some countries. There is also an unnecessary number of layers of fabric involved, as they are not requisite for the child's warmth under ordinary circumstances. The process of dressing or undressing is really an ordeal to the infant, as it is alternately rolled upon its back and belly in the nurse's lap, in order that one band after another shall be fastened by pins or stitches. Very much of this dressing is unnecessary, if not harmful. First of all is the "band," a girdle enveloping the trunk from about the nipple to the iliac crest. Such an appliance is useful during the healing of the navel; afterwards it is not of use if tight. The abdomen needs no support in health, and the compression of the ribs is not advantageous, and so far as such a girdle affects the question of hernia (which it is popularly supposed to prevent), it is thought it rather favors the production of the inguinal variety. A loose girdle worn to prevent chilling is advisable in hot weather, and in cold weather a flannel girdle or binder, cut bias to secure elasticity, makes a useful envelope for the entire trunk of very young children as a preventive of bronchitis.

As a means of getting rid of the objectionable feature of the ordinary dress, the following plan was originally devised by Dr. Grosvenor, of Chicago, for use in his own family, and subsequently published by him. There are three garments, besides the napkin, all

covering the neck and shoulders, reaching about ten or twelve inches below the feet. The outer garment, as well as the middle one, is a little larger in every dimension than that beneath it, so that no binding shall take place. They are all cut in the girdleless pattern called Princess. The inner one has sleeves, and may be made of cotton flannel or very soft wool flannel. If wool is used, care must be taken against shrinkage in washing. The next garment has no sleeves and seams at the armholes, to insure against pressure there. The material is wool flannel. The outer one is the usual dress, with high neck and sleeves, the details of which may be modified to suit the taste. Thus, except the sleeves, the thickness is the same throughout. At night a garment like the inner one above described and a napkin only are worn. These three garments are placed one within the other before commencing to dress the infant, pains being taken to avoid wrinkles and folds, and they are put upon the child as one garment with very little trouble. They are removed with equal ease.

The napkin may be made of any suitable kind, *i. e.,* soft and absorbent material, easily washed. Linen has no real advantage ordinarily over cotton, except æsthetically. Old linen is soft, but likely to be thin. It is desirable to diminish the bulk of napkins as far as possible, to prevent uncomfortable pressure. This is accomplished by having a small napkin simply to cover the seat and genitals thick enough to retain the urine and fæces, covered by another one not thick, but large enough to envelop the hips. The age at which napkins may be discontinued depends upon circumstances. Among English families of the better classes, apparently, children are taught to make their needs known earlier than is usual with us. Much can be done by an attentive nurse or mother who will hold the child over a vessel close to a warm fire. The heat will cause the child to urinate, and immediately after, cover the child up, and it is surprising how quick it will learn when thus exposed for what purpose it is done. In the same manner, at stated times, their bowels can be made to move. But children vary greatly in this particular, and under no circumstances is any severity justified, or even scolding, as nervousness or anxiety on the part of the child simply aggravates the trouble. As soon as the child can regularly give notice of its wants in this respect, it is time to discontinue the diaper, as its absence gives greater freedom of the limbs. Of course at all times napkins should be changed as soon as discovered to be damp or soiled. Rubber or other impervious covers for diapers should not be used. Even the exigencies of a railway journey, with the conveniences usual in this country, do not require their employment. They simply convert a wet napkin into an unclean fomentation. When a child begins to use its limbs freely, the clothing should be shortened. In fact, there is no real need of long clothes at any time, except to save labor in keeping the infant's feet covered. When it begins to creep, its maneuvers are facilitated by slipping over its skirts a loose pair of baggy breeches of woolen, which should be tied

around its waist and buttoned about the knees. This keeps the skirts from impeding its progress, and protects it against floor draughts.

The dress of older children should conform to the same hygienic requirements as given above. The two most frequently discarded are freedom from constriction and uniformity of protection. The former is violated by the use of tight girdles, or even corsets, tight sleeves, garters, and misshaped stockings and shoes. Their harmfulness is well understood. The neglect is usually a wilful preference of fashion to healthfulness. The same might, perhaps, be said of the fashion of unevenly distributing the clothing over the person, but the injurious effects of this are less understood. Chilling is resisted far better if the whole person is exposed to the same temperature, than if one part is exposed to a lower temperature than another.

It is a matter of universal experience that many persons who rejoice in outdoor life, even in severe weather, are directly injured by a draught and by sitting near a window. Yet formerly more than now low-necked dresses were used for children, the entire shoulders being exposed, while the remainder of the trunk was burdened with dress. At the present time fashion exposes the legs more. Shoes and stockings are often too thin; but in particular children are too often dressed with the lower limbs bare from above the knees to a little above the ankles, the foot being covered by a slipper. This fashion seems to be more common in Europe than in America. The lower limbs should be thoroughly clad, not cumbrously, but warmly. The stockings of a child old enough to run about should be long enough to meet or be overlapped by the next article, napkin or drawers, as the case may be. Stockings of wool, for the reasons already given, are to be preferred. They should be soft. They should not be pointed at the toes, but be wide enough to admit of ample play in every direction of the anterior part of the foot. Color is not indifferent, as some dyes have been found to produce eruptions on the skin. Public attention has, however, been so thoroughly drawn to this subject as to have led in some instances to legislative enactments, and such dyes are probably less frequently used than formerly. Aniline reds have been thought to be especially irritating.

Shoes of proper shape are not so easy to get for children, not nearly so easy as for adults. This comes probably partly from the supposed necessity of making them for a low price, and partly from a belief, often openly expressed, that a "baby's foot has no shape." It is not enough that a shoe should be as wide or wider than the foot, but it should have its width rightly disposed. The space where the foot does not demand it in nowise compensates for pressure elsewhere. The result must evidently be a distortion. In choosing shoes for infants it is better that they should be unduly long, if that be necessary to obtain the requisite width in front, than that they should be narrow.

The care of food has been treated of elsewhere.

To the care of drinking water the same general rules of cleanliness apply as to the care of food. But if the supply of water is not good, the consumer is usually less able to remedy the difficulty than he is in the matter of food.

If water is too hard, it can be improved somewhat by boiling, which causes the deposit of part of the lime. If the water is impure from organic matter, the impurities may or may not be deleterious to health. Water from ponds is often high-colored, and even at times disagreeable in odor from vegetable matter without any mischief following its use. We have known typhoid fever resulting from the use of well-water where there were contaminations from privies, although the well-water seemed to the eye and the nose to be pure. Perfectly efficient filters which yield any considerable amount of water (porcelain filters, etc.) are too costly for general use. But water can ordinarily be made safe by thorough boiling for fifteen or twenty minutes, but better still by boiling two successive days and subsequent coarse filtration through filter paper or a wad of absorbent cotton packed neatly into the bottom of the funnel. The entire outfit of a large funnel and a water-vessel costs but very little. It may be of tin if constantly watched and cleansed.

The use of iced water is undesirable, for various reasons. The ice may be impure, and freshly-made iced-water is not proper for children's consumption. Both difficulties may be overcome by putting the household drinking water into large corked bottles or into glass jars, and placing them near the ice or in the refrigerator. In this way water may be had that is cooler than ordinary spring water and safe to drink. If the taste of water that has been boiled seems insipid, as it is apt to do at first, the addition of a minute quantity of salt generally renders it palatable.

Outdoor Exercise.—Except in inclement weather, most children are better for being out daily to receive the influence of the sun and the pure air. Of course exceptions exist, particularly in winter. Children may be wrapped up when the room is thoroughly aired as often as necessary during the day, when the weather is inclement, and they can not be carried out without exposure to the cold.

CHAPTER XXIII.

DENTITION.

Definition.—The term "dentition," as generally used, refers only to that stage of development when the tooth is penetrating the superficial tissues of the gum. The period between the seventh month, when the first teeth appear, and the end of the second year, at which time the second temporary molars erupt, is spoken of as the dentition epoch.

By the second dentition is meant the eruption of the permanent teeth.

"The germs of the milk-teeth make their appearance in the following order: At the seventh week, the germ of the first molar of the upper jaw appears; at the eighth week, that of the canine tooth is developed; the incisor papillæ appear about the ninth week (the central preceding the lateral); lastly, the second molar papillæ appear at the tenth week, behind the anterior molar. The teeth of the lower jaw appear rather later, the first molar papillæ being only just visible at the seventh week, and the tenth papillæ not being developed before the eleventh week."[1]

ERUPTION OF THE TEETH.

Between the sixth and eighth months after birth the two lower central incisors erupt, usually simultaneously.

Between the eighth and tenth months the two upper central incisors appear, followed shortly by the two lateral incisors.

Between the twelfth and fourteenth months the two upper anterior molars, the two inferior lateral incisors, and the two lower anterior molars appear, in the order mentioned.

Between the sixteenth and twenty-second months the four canine teeth erupt.

Between the twentieth month and the end of the third year the four posterior molars erupt.

The eruption of the twenty milk-teeth is now complete, and no more teeth appear until the fifth or sixth year, when the eruption of the permanent teeth commences.

SHEDDING OF THE DECIDUOUS TEETH.

The temporary teeth drop out in about the same order as they appear.

Scarcely a year elapses after calcification of the milk-teeth is complete before absorption begins.

[1] "Gray's Anatomy," eighth edition, p. 753.

Normally absorption begins at the apex of the root and advances toward the crown. Shortly after the root has disappeared, the crown is removed either by the advancing permanent tooth or by an accidental rupture of the attachment between the neck of the tooth and the mucous membrane of the gum.

DEVELOPMENT AND ERUPTION OF THE PERMANENT TEETH.

The germs of the first permanent molars appear during the fourth month of embryonic life. At about the same time may be noticed the first steps in the formation of the twenty anterior teeth of the second set. The germs of the second permanent molars do not show themselves until the third month after birth, and those of the third molars (wisdom teeth) not before the third year.

The epithelial cords of the twenty anterior teeth spring from the epithelial cords of the corresponding temporary teeth. The cords for the twelve permanent molars arise either from the epithelium of the mouth, or from successive extensions backward of the epithelial cords of the posterior milk-teeth.

The development of the permanent teeth is similar to that of the deciduous teeth.

Calcification of the permanent teeth begins in the first molars about the sixth month of fœtal life.

"First year after birth, central and lateral incisors begin calcification. At four years of age, cuspids, bicuspids, and second molars begin calcification. At eight years of age, the third molars begin calcification."[1]

To accommodate the developing molars, the jaw increases in length by the addition of bony material at the posterior border. As the permanent teeth erupt, the sockets and roots of the temporary teeth disappear by absorption, and new alveoli are built for the second set.

Ordinarily, the permanent teeth erupt at the following periods, the teeth of the lower jaw preceding those of the upper:—

Sixth year, first molars.
Seventh year, central incisors.
Eighth year, lateral incisors.
Tenth year, first bicuspids.
Eleventh year, second bicuspids.
Twelfth to thirteenth year, canines.
Twelfth to fifteenth year, second molars.
Seventh to twenty-first year, wisdom-teeth.

PRECOCIOUS DENTITION.

It is not uncommon for dentition to begin prior to the sixth or seventh month. Some children are even born with teeth. Many interesting examples of this singular anomaly have been placed on record.

[1] "Gray's Anatomy," eighth edition, p. 753.

The younger Pliny states that the Roman Consul Manius Curius had a full set of teeth at birth, on account of which he was named Dentatus. I have known of two infants each of whom was born with a tooth through the gums.

In some congenital cases, teeth are less dense than normal teeth, have no root, become loose and drop out during the first few months of life, and are replaced by the deciduous teeth proper. In other cases these congenital teeth have been known to remain until dispelled by the permanent teeth, and were therefore undoubtedly genuine milk-teeth.

Precocious dentition is usually associated with premature ossification of the bones, particularly those of the head. As a consequence there is early closure of the fontanels and sutures, which may interfere with the normal development of the brain.

After the premature eruption of one or more teeth, dentition may cease from four to twelve months, or even longer, as a result of malassimilation from some cause.

Premature dentition is believed by some observers to be evidence of tubercular, scrofulous, or syphilitic diathesis. It is, however, sometimes observed in children in whom no inherited taint can be discovered.

RETARDED DENTITION.

It is very common for the beginning of dentition to be deferred for several months after the normal period. In some rare cases teething does not commence until the second year or later.

Delayed dentition is an indication of a late general development, and in the vast majority of cases, the result of rachitis. As a rule, in cases of protracted teething the anterior fontanel closes later than the seventeenth month, the normal period, and ossification of the bones is also delayed. Teeth that are cut late are frequently marked by imperfections of the enamel, lack of density, and decay very early.

ABSENCE OF TEETH.

Deficiency in the number of teeth is of more frequent occurrence in the permanent than in the temporary set. A milk-tooth may fail to appear because of the destruction of its germ by traumatism or disease. In the permanent set the upper lateral incisors are most frequently found missing. Cases are reported where a missing tooth has been found lying horizontally in the jaw. The total absence of teeth is an exceedingly rare anomaly. There are but few cases said to be on record.

IRREGULARITIES IN THE ORDER OF ERUPTION.

It is not uncommon for the normal order of eruption to be violated. The upper incisors often erupt first, and when such is the case, their appearance is usually delayed. The lateral are sometimes cut before the central incisors. In rare instances the molars or canines

precede the incisors, a posterior molar erupts before a canine, or a canine protrudes prior to an anterior molar.

MALPOSITION OF THE TEETH.

Malposition of individual teeth is of much less common occurrence in the deciduous than in the permanent set, and when found is usually limited to a slight torsion, or overlapping of the upper or lower incisors. The permanent teeth most frequently malposed are the inferior incisors and canines; next, the superior incisors; after these, the third molars.

All sorts of irregular arrangements are seen. The involved teeth may be twisted on their axes, overlay one another, or be displaced within or without the dental arch.

Displacement of the teeth occurs when the jaw is too small for their proper accommodation. The blending of types by the intermarriage of different races is a well-recognized source of a small jaw and large and displaced teeth.

Persistent thumb-sucking is said to cause a forward direction of the upper anterior teeth and a backward inclination of the lower front teeth, with more or less deformity of the jaw.

MALFORMATIONS OF THE TEETH.

There are numerous departures from what may be regarded as the typical form of a tooth. Large teeth with very small roots, an increased number of cusps or fangs, outgrowth from the crown or fang, twisting, bending, division, or coalescence of the roots, are among the variations in shape.

The surface of a tooth is often marked by transverse or vertical ridges and furrows or pittings, the enamel being apparently perfect. These ridges and furrows are analogous to the ridges and grooves seen on the nails, both the result of interrupted nutrition.

The enamel of a tooth may present a few excavated spots or a general honeycombed appearance, due to a disorganization of this structure. Sometimes the crown of a tooth is entirely devoid of enamel.

Pigmented spots, and spots having the appearance and consistency of chalk, are not uncommonly observed.

A large proportion of artificially-fed children have faulty permanent teeth later in life.

There is sometimes an absence of enamel at the middle of the biting edges of the upper central incisors. The exposed dentine is soft and but partly calcified, and is soon worn away, leaving a crescentic notch in the edge of each tooth. Notched milk-teeth are of no special diagnostic import. But when the permanent upper central incisors are notched, they are almost invariably an indication of congenital syphilis.

Mr. J. Hutchinson was the first to call attention to this condition of the teeth in inherited syphilis. They are known as "Mr. J. Hutchin-

son's teeth." This peculiarity in the upper central incisors was at one time thought to be caused by stomatitis; but at present it is believed to be the result of an arrest of development in the central or first-formed portion of the teeth.

In subjects of congenital syphilis, both the temporary and the permanent teeth may be crescentic. A number of such cases have come under my observation.

SYMPTOMATOLOGY AND ALLEGED DISORDERS OF DENTITION.

Dentition is a purely physiological process, and, like other physiological processes, is subject to irregularities from local and constitutional disorders. It is affirmed, however, that its etiological potency is questionable.

It is true, functional derangements and organic disease are more common, and the mortality greater, between the ages of six months and two years than at any other period of childhood; but hereditary, dietetic, hygienic, and educational influences are said to furnish causes more rational and demonstrable than the presumed irritation of a hidden tooth germ.

There never has been any unanimity of opinion on the subject of how teething produces the numerous disorders attributed to it.

It is said that dentition is more severe in the winter than in the summer, and *vice versa;* that it is more so in the large cities than in the country, and its consequences are more serious in badly-nourished children and among the poor; that diseases during dentition are rendered more dangerous by this process; that teeth erupt with more difficulty during the course of any severe malady; that the cutting of the incisors, on account of their sharp edges, is more painful than the extrusion of molars; that the eruption of the molars causes the most pain because of their broad crowns; that the eye-teeth, owing to their long fangs, are liable to give rise to cerebral disturbances; that the protrusion of the stomach-teeth is likely to be attended with vomiting and diarrhea or cough; that it is the evolution of the molars that causes the most cerebral and intestinal troubles. Then, again, the forward pressure of the advancing tooth-crown on the superimposed gum, the backward pressure of all the teeth together, are thought, by their respective advocates, to account for the many complicating ailments of dentition.

In the estimation of many writers the semeiology of dentition embraces drooling, rubbing the one jaw or the other, biting the fingers or any hard substance that can be carried to the mouth, fever, restlessness, peevishness, fretfulness, disturbed sleep, flushing of the cheeks, itching of the nose, dilated pupils, conjunctivitis-otalgia, pain and inflammation of the gums, aphtha, thrush, anorexia, vomiting, diarrhea, bronchitis, convulsions, local spasms, and paralysis, and cutaneous eruptions. Drooling is said to be the first indication of approaching dentition, and it is thought to be the result of a stimulation of the

salivary glands by an irritation transmitted through the chorda-tympani from the gums. It is believed that drooling keeps the gums soft, relieves the congested capillaries of the gums and mouth, and "drives the blood from the brain, and moderates its irritative condition."

Slavering is observed to commence in all healthy and normally-developed infants between the third and fifth months, and generally ceases before the eighteenth month. In sickly and backward children, it usually begins later, and may continue for several years.

While the infant is fed at the breast, there is no requirement for either teeth or saliva; still the development of both the teeth and the salivary glands must of necessity be well advanced toward completion before the period of weaning. Hence, instead of regarding this copious flow of saliva as a manifestation of a morbid action of the salivary glands dependent upon dental irritation, it would be more reasonable to assume that it, like the eruption of the teeth, simply betokens a stage of developmental activity in which there is a preparation of the digestive organs for the reception and utilization of the aliment that is to succeed the maternal milk.

The rubbing of one jaw on the other and biting on the fingers or any substance that can be carried to the mouth, are supposed to be indicative of a feeling of uneasiness or itching in the gums induced by the upward pressure of the teeth; and some smooth and hard material is recommended for the child to bite on, with the view of allaying the pruritus and hastening the absorption of the superimposed gum.

Jacobi says: "Is it astonishing that an infant will, during dentition, take everything to its lips and into its mouth, after it has done so all its life? The principal impression an infant obtains depends on its relation to food and drinks. Eating is the only real propensity an infant has, and the mouth is known by experience to be the great receptacle destined for the reception of everything around; not to speak of the lips being used as a means of touching, grasping, and learning the qualities of things."

The grinding of the teeth in children who have completed their first dentition is evidently at times due to some derangements of the economy. The biting motion of the jaw in infants before and during dentition may likewise be occasionally excited by some irritation, but it is not necessarily seated in, or reflected from, the gums. It should be remembered that muscular action is essential to muscular development; that a healthy child is in almost constant motion while awake; and that the masticatory movements may be, and probably are, but a part of the general gymnastics in which the child indulges. An infant can not walk, neither can it masticate food, yet it exercises both the muscles of locomotion and those of mastication, developing and educating them for their respective functions, when, at a later period of existence, these shall become necessary.

Fever, restlessness, peevishness, fretfulness, and disturbed sleep are the commonest manifestations of infantile derangements. Fre-

quently they are coincident with eruption of a tooth or a group of teeth. When such is the case, a superficial examination may lead the physician to conclude that a relationship exists between them, whereas a careful and thorough investigation will generally bring to light some associated condition which at another time would be considered quite adequate to produce these symptoms. If fever and general irritability were symptomatic of dentition, they should be continuous throughout its whole duration, or co-incident with the eruption of each group of teeth, instead of appearing at uncertain times; and, furthermore, they should be present in at least a mild degree in every child.

Slight disorders, presenting a few indefinite symptoms, occur at all ages, and the physician is now and then at a loss to satisfactorily account for them. Peripheral impressibility is very pronounced in the infant, particularly in one whose power of resistance is lessened by some constitutional vice; and any slight irritation, as from indigestible food or parasites in the alimentary canal, constipation, disarranged clothing, a misplaced pin, or a soiled napkin, may give rise to a greater or less degree of fever and general uneasiness.

Very often trifling disorders that are viewed as evidence of difficult dentition are directly or indirectly dependent upon rachitis. This is one of the most common of children's diseases, and frequently a mild form of the affection passes unrecognized because its symptoms have received a wrong interpretation. The local and general disturbances, in the estimation of the parents, and not infrequently in that of the physician, too, merely mark the dreaded teething epoch, the attendant perils of which every infant is destined to encounter. The tardy dentition and lateness in walking are regarded as nothing but harmless freaks of nature, and instances are cited where the same peculiarities have been noticed in other members of the family. When rachitis is recognized—and it should be before any deformities of the bones are visible—and an appropriate line of treatment adopted, recovery generally follows; the teeth are cut rapidly, and, owing to the extra attention bestowed on the child, few, if any, of the ordinary derangements of infancy occur.

Vasomotor disturbances, as the transient flushing of the cheeks, or sudden pallor of the countenance, are often noticed during the time, and, it is said, are a consequence of dentition. But it should be remembered that there are many conditions in which these symptoms are present, and they must receive careful consideration before making a diagnosis of difficult dentition. It will then seldom be necessary to fall back on teething.

Conjunctivitis is said, now and then, to occur on the side on which the teeth are protruding.

Otalgia, as is indicated by crying and the carrying of the hand to the side of the head, has been declared one of the reflex disturbances of dentition. In congestion or inflammation of the middle or external ear, meningitis, or cerebral hyperæmia, the child carries its hand to

the neighborhood of the ear, and gives evidences of suffering. Most of the earache in children is dependent upon acute ostitis; and many an ostitis is neglected until the organ of hearing is irreparably damaged, because "the doctor said the ear would stop running when the child cut all its teeth." "The doctor" had evidently forgotten that the same predisposing and exciting causes could be operative before the eruption of the last of the twenty milk-teeth as afterwards.

Redness, swelling, and tenderness of the gums during the time of dentition are generally held to be symptomatic of some difficulty in the eruption of the teeth.

The gums of a healthy child are of a pale pink hue. As a tooth approaches the surface the gum in that locality becomes more prominent, grows paler in color, until it is almost white, and is anything but sensitive. Over the summit of a tooth just before it reaches the surface, a depression is often observed, due to the disappearance of the epithelial and subepithelial layers, by a necrotic process. Sometimes the gum over the crown of an erupting tooth becomes inflamed and tumid, and an incision may give exit to a drop or two of thick, black blood. The gum around the top of a tooth that is partly through the gum is oftentimes inflamed. This condition will be seen where repeated attempts have been made at "rubbing the tooth through" with a thimble, finger-nail, or other hard substance. Ulceration of the gum over a tooth now and then occurs from impingement of a sharp corner of a corresponding tooth that has erupted in the opposite jaw.

It is said that it is doubtful if dentition be ever the sole cause, or indeed a cause at all, of gingivitis.

When stomatitis is present, some cause other than dentition should be sought. The vast majority of cases of stomatitis occur in bottle-fed children. It is generally associated with some derangement of the organism, particularly the digestive tract. The child's diet or hygiene is usually at fault. The use of foul nursing-nipples, a dirty teething-ring, and filthy sugar-teats, thumb- and tongue-sucking, and irritants taken into the mouth, as hot fluids, principally tea and coffee, drugs, or substances the child may pick up while wandering around on the floor, may give rise to stomatitis.

Diarrhea in teething children has by some writers been attributed to the swallowing of large quantities of saliva, the salts contained in it being supposed to act as a mild aperient. By others, the reputed dental diarrhea is thought to be of a neurotic character—an irritation being transmitted through the sympathetic nerves to the vagus, influencing the glandular secretion of the digestive tube or producing a hyperperistalsis of the intestines.

Vogel says, "A mild diarrhea, five or six evacuations in the twenty-four hours, is very beneficial to teething children, for cerebral affections are thereby most surely prevented." J. Dorning, M. D., says: "Many children are sacrificed annually through a belief in such an erroneous doctrine. Diarrhea may occur at the time a tooth is pro-

truding, or at successive periods of dental evolution, but never in consequence thereof. Children who are fed exclusively at the breast at proper intervals, and whose hygiene receives careful attention, seldom suffer with a diarrhea before the period of weaning. Then, again, diarrhea is strikingly more prevalent in one season than in another, notwithstanding the eruption of teeth at all periods. These two facts rather militate against the theoretical existence of diarrhea from dental irritation."

The causes of intestinal derangements are improper feeding, bad hygiene, and changes produced in the atmosphere, especially in a city, by a high degree of solar heat. The most significant of these causes of diarrhea, it must be borne in mind, is improper feeding. Most babies at the breast are nursed too often. Bottle-fed infants, in addition to being fed too frequently, labor under the disadvantage of not having provided for them a suitable substitute for their natural food.

Too commonly undue importance is attached to the appearance of the first tooth. Its presence is hailed as the beginning of a new era in the child's existence, and no opportunity is lost in putting the anxiously-watched-for organ to a legitimate use.

Bronchitis is thought to be due to the saturation of the covering of the chest with saliva that flows from the child's mouth—a plausible view. It is also said to be due to a nervous irritation reflected from the gums.

Because an attack of bronchitis will now and then subside on the eruption of a tooth, it does not follow that the cutting of the tooth is the cause of the bronchial inflammation; for a mild attack of bronchitis will get well spontaneously in a child free from any predisposition, whether a tooth be coming through or not. After a child has begun to creep or walk, it is more exposed to atmospheric changes than earlier in life; hence the greater frequency of attacks of bronchial catarrh during the second year. Rachitic and scrofulous children are subject to recurring attacks of bronchitis; and the great prevalence of rachitis should not be overlooked.

Convulsions varying in form from slight twitchings of particular groups of muscles to a general eclamptic attack, are said to have an origin in dentition. Frequently a child will sleep with the eyes half open and the eyeballs rolled upward, presenting a most appalling spectacle to the inexperienced mother. Or a smile will occasionally flit over the infant's countenance, caused by the contraction of the facial muscles—a pleasing sight to the sentimental mother, whose creative imagination conjures up a vision of angels whispering to her sleeping babe.

Now and then a general convulsion will occur, perhaps with the eruption of a tooth, or at successive periods of dental protrusions.

But it must be remembered that during the dentition period or epoch the whole organism is in a state of active development; that the nervous system has not acquired the stability or equilibrium of

the youth or adult, and is therefore extremely susceptible to external impressions, as is evidenced in the marked manifestations of disturbed function that are produced by what in the more mature individual would be considered trifling affairs. The convulsions are much more extensive in infancy and childhood than later in life.

In the majority of cases, convulsions are traceable to some irritation in the alimentary canal. Rachitic children are peculiarly liable to convulsions. In some cases, the most painstaking examination fails to reveal the cause of the convulsion.

Cutaneous eruption—notably, eczema, lichen, uticaria, and impetigo—are very common between the sixth and twenty-fourth months, and, like diarrhea and convulsions, may appear contemporaneously with the cutting of a tooth.

The delicate and sensitive nature of the child's skin renders it susceptible to disorders from slight irritation. Inherited or acquired predisposition, derangement of the digestive organs, usually from some fault in the diet, some disturbance of the nervous system (not always to be accounted for in an adult), lack of cleanliness, immoderate bathing, the use of strongly alkaline soaps or impure toilet powder, rough handling in washing, drying, or dressing the child, irritation from the clothing in either quality or arrangement, but not dentition, may give rise to cutaneous eruptions.

CHAPTER XXIV.

PUBERTY: ITS PATHOLOGY AND HYGIENE.

Puberty has been defined as the period of life within which reproductive capacity becomes established. The term "puberty" will be used as signifying merely the epoch intervening between childhood and adult age or manhood. Under ordinary circumstances, this period is marked by the evolution of the organs of generation, together with those protean physiological changes and new etiological relations that are connected therewith. So important and complex are the latter that of all the successive stages of growth, maturity, and decay into which the brief span of human existence is biologically divisible, there is perhaps no one epoch the pathological aspects of which are of such frequent interest to the medical practitioner as that which forms the subject under consideration.

In infancy and childhood the vital powers are occupied exclusively with the nutrition and growth of organs essential to the existence of the individual. During puberty, on the other hand, in addition to this, as a rule there now occurs the still more remarkable evolution, structural and functional, which controls the perpetuation of our species. The physiological actions which are necessary for their object are, as was well observed by Dr. Roget, "great and commensurate with the magnitude and importance of the design," and they give rise to that rapid and varied succession of changes, mental as well as physical, which are essential for the perfected development of that marvelous trophy of creative power,—"the living microcosm of man's body."

Nor are these developmental changes purely physiological, but, on the contrary, inasmuch as "the seeds of death are inseparably intermixed with the germ of life," they are closely connected with, or productive of, numerous special pathological proclivities or tendencies to disease, which will be separately considered in the succeeding pages.

CIRCUMSTANCES AFFECTING THE EVOLUTION OF PUBERTY.

The age when the vital changes usually included in the term "puberty" may take place does not admit of any rigid limitation, as their occurrence is necessarily so affected by inherited predisposition or family temperament, constitution, or idiosyncrasy, and the incidents and circumstances of life, in each individual, as well as by the agency of disease, and above all by the potent influence of climate, as to preclude the possibility of more than a mere approximation to any general rule in reference to the normal date of the commencement of this epoch.

PERIOD OF ESTABLISHMENT OF PUBERTY IN FEMALES.

The advent of female adolescence is datable from the first appearance of the catamenia, which, *ceteris paribus,* occurs earliest in warm climates, sanguine temperaments, and highly civilized and luxurious states of society, and is retarded by the opposite conditions. In the southern climate in this country it is very common for the catamenia to appear much earlier than it does in the northern portion of the country. The writer has observed its appearance at ten and eleven and twelve years of age. The writer had a case of an infant who menstruated in four weeks after birth for four days, natural flow to all appearances. The parents of the child did not wish the case to be known, and moved to the country, and the case could not be kept track of.

More frequently, however, in cold or temperate climates such as ours, the evolution of menstruation is retarded beyond the usual period. In several instances I have known of cases who were sixteen and seventeen years of age before the first appearance of the catamenia. Dr. Gwinn, in his "Dictionary of Medicine," shows the result of an investigation by Dr. Madden, in which he says: "This investigation extended over a considerable period and a large field of inquiry, having been commenced during my connection with the Rotunda Lying-in Hospital, and subsequently being continued in the gynæcological wards of the institution to which I have been attached for the last twelve years. The great majority of statements of those whose menstrual history was investigated, proved so indefinite or unreliable that in only an infinitesimal proportion of them—namely, in four hundred and ninety-seven instances—was I able to obtain any accurate data on this point. In these latter cases the ages at which menstruation first occurred were as follows:—

Under 12 years of age 4 menstruated for the first time.
At 12 years of age 17 menstruated for the first time.
At 13 years of age 50 menstruated for the first time.
At 14 years of age 94 menstruated for the first time.
At 15 years of age 138 menstruated for the first time.
At 16 years of age 105 menstruated for the first time.
At 17 years of age 65 menstruated for the first time.
At 18 years of age 10 menstruated for the first time.
Over 18 years of age 14 menstruated for the first time.

"From the foregoing table it appears that of four hundred and ninety-seven cases where the date of the first catamenial period was ascertained, menstruation occurred between the fifteenth and seventeenth years in three hundred and thirty-seven instances, and that in this triennial period its first manifestation most commonly took place at the sixteenth year, which may therefore be regarded as the average normal date of the commencement of female puberty."

EVOLUTION OF FEMALE PUBERTY.

The transition from girlhood to puberty, the normal date of which has been referred to, is, notwithstanding the far greater complexity of the physiological changes involved, much more direct and sudden than is the case with the corresponding period in the opposite sex. In the primary stages of life the functional differences between the sexes are comparatively slightly marked; but on the occurrence of puberty in the female, these become sharply accentuated. They are noted by the sudden development of the reproductive or sexual organization, including the accessory parts, such as the mammæ and external genitals, as well as the essential organs of generation, and more especially the enlargement of the ovaries, the maturation of their Graafian follicles and contained ova, and, in fine, the evolution of the entire utero-ovarian system, the predominant influence of which on the general economy is tersely summed up in the old aphorism, *"Proptes uterum est mulier."* From this moment the girl passes at once from childhood to full procreative maturity, as evinced by the establishment of menstruation. This function, which results from the processes of ovulation and uterine denudation, leads to that periodic sanguineous discharge by the regular monthly recurrence of which, during the ensuing thirty years or so of life, the term of woman's distinctive sexual reproductive vitality is measurable.

PERIOD OF PUBERTY IN THE MALE.

The commencement of this epoch in man is less definite in its characteristics and in the age of its occurrence, than is the case with the opposite sex. "In Great Britain," and I believe a similar law generally prevails in this country, "a boy is not legally considered as arrived at puberty until the age of fourteen, when supposed sexual capacity and legal responsibility for the crime of rape commences." By the old Roman, however, another and a better standard of adolescence was provided, this term being considered synonymous with the period at which liability to military service began, namely, at the age of fifteen, the ordinary date at which the physiological change from boyhood to manhood, to puberty, occurs in all temperate climates. The approach of this epoch is now denoted by a characteristic modulation of the voice, which becomes altered from "thin, childish treble to the deep, manly bass," caused by the development of the larynx and vocal cords, the enlargement of the pomum Adami, and the elongation of the thyroid cartilage and the thyroarytenoid muscles. About the same time is also noticeable the first appearance of that downy growth on the face, so fondly watched and cultivated by its proud possessor as the badge of emancipation from "the pedagogue's stern rule," and the evidence of the advent of the bright springtime of life, when

> "A young man's fancy lightly turns to thoughts of love." (Madden.)

There now also occurs the growth of hair on the pubes, etc., the

commencement of the structural and functional development of the testes and other parts of the genital organs, and their instincts. The successive changes, however, proceed so gradually that their full completion is not reached until some years have elapsed, and is said often to be delayed until long after the legal term of manhood has been attained.

PREMATURE PUBERTY IN MALES.

Although, as already observed, the vital changes connected with the transition from childhood to adolescence are, under ordinary circumstances, seldom accomplished before the sixteenth year, and are frequently delayed until a much later period of life, occasionally this customary course is departed from, and in these fortunately exceptional instances the whole system, physical and mental, or, as more frequently is said to happen, particular powers or organs, become prematurely developed at an abnormally early age. There are numberless instances of mental precocity on record. As Dr. Elliston has observed, a perfectly authentic case has removed all doubts respecting the boy at Salamius mentioned by Pliny (Hist. Nat. Lib. VII, C. 17) as being four feet high and having reached puberty when only three years old, and respecting the man seen by Craterus, the brother of Antigonus (cited in Blumenbach's Physiology, fourth edition, p. 535), who, in seven years, was an infant, a youth, an adult, a father, an old man, and a corpse.

If the mental faculties be too early developed, with an almost absolute certainty of their subsequent failure at a correspondingly untimely age, it is not to be wondered at that a like extraordinary precocity should in some unfortunate instances exhibit itself in a premature evolution of the sexual functions, the unhappy subjects of which, instead of growing up with gradually increasing vigor to the possession of a healthy manhood, sink into a premature old age, mentally imbecile and physically decrepit, at what should normally have been a period of vital maturity.

DISEASES OF PUBERTY.

Of the various factors we notice in the etiology of disease, there is none more obvious in its effects than the influence of age in the causation of the chief maladies to which each period of life is specially susceptible, and which seldom occur at other epochs. Thus, as remarked by Dr. Elliotson, "we rarely see gout in an infant, nor is it common for old persons to have the symptoms of acute hydrocephalus." This elective affinity of certain disorders for particular ages, is strikingly exemplified during puberty by the special tendencies then manifest in both sexes to development of strumous or tuberculous disorders and gastro-intestinal complaints, as well as by the various acute inflammatory and hemorrhagic diseases—pulmonary, cerebral, and hepatic—which are then so prevalent; whilst in females the special pathological

proclivities accompanying puberty are, as will be seen later on, still more directly connected with the newly-developed functional activity of the utero-ovarian system.

SPECIAL DISORDERS OF FEMALE PUBERTY.

The chief characteristic of the change from girlhood to puberty, which in our climate generally occurs at the fifteenth year of age, or thereabouts, consists in the regular establishment of that periodic action of menstruation, for the accomplishment of which the conjoint functional activity of the ovaries, Fallopian tubes, and the uterus, is essential. This process commences in ovulation, or the maturation of a Graafian follicle, followed by the escape of the contained ovum, and its transmission by the Fallopion tube into the uterus, whereupon there also occurs a disintegration, or shedding of the endo-uterine lining membrane, which, the subjacent surface thus unsealed, leads to a hemorrhagic exudation or discharge per vaginam, amounting to six or eight ounces, and extending over a period of from three to five days. I have known some who menstruate seven days, it being their natural diathesis. Immediately before the catamenial epoch, the patient suffers more or less from general malaise, languor, and heaviness; she is indisposed to exertion, and complains of pain in the back and loins, and down the thighs; occasionally there is some uneasiness and a sense of constriction in the throat and about the thyroid glands. There is a peculiar dark shade over the countenance, and especially underneath the eyes; the cutaneous perspiration and breath have a faint sickly odor; the mammæ are enlarged and often painful; digestion is sometimes impaired, and the appetite fastidious. After these symptoms have been present for a day or two, under normal circumstances, the menses appear, and the uneasiness subsides.

In a large number of cases, however, the nervous disturbances connected with the establishment of menstruation are of a more serious nature than in those just referred to, and these will now be considered.

HYSTERICAL DISORDERS OF PUBERTY.

The frequent occurrence of hysterical and other cerebro-nervous disorders in females about the age of puberty, which we find so often in our daily practise, is evidently strictly consequent on the complex structural and functional changes then in process in the reproductive system, the predominant influence of which is manifest in every vital action from the dawn of puberty until the termination of the period when utero-gestation is possible. The commencement of this epoch is marked by a sudden and complete revolution in the female mental as well as physical constitution. At each succeeding ovulation there is also a coincident recurrence of constitutional and nervous disturbance acting on the general system through the widespread ramifications of the vasomotor sympathetic system, so that no woman should allow

the approach of her husband at these periods, which I have often been told is the case. A woman is "unclean," and should occupy a separate room at these monthly epochs.

When menstruation has become established, and is regular in every respect, the accompanying nervous disturbance may be so slight as to escape observation. But the earlier catamenial periods, as well as every subsequent deviation from normal menstruation, are so frequently attended with some manifestation of hysteria under the guise of nearly every complaint then incidental to female youth, that whether the trouble be spinal, cardiac, pulmonary, or indeed any of those obscure complaints common to that age, and for which no obvious physical evidence is apparent, the experienced practitioner may very frequently be able to trace the trouble to the sympathetic nervous disturbances that are connected with the evolution of puberty. It scarcely need be added, however, that whilst thus prepared to meet with the protean forms of hysteria, simulating and complicating the most common diseases prevalent during this epoch, the physician should be no less forewarned against the much graver error of ignoring or neglecting the obscure evidence of actual physical disease in any patient, however hysterical she may be.

It would be impossible, within the limits of this article, to refer in any way to the widely-extended list of authors, of every age and country, by whom the hysterical disorders of puberty have been described. One of the earliest writers on this subject was Hippocrates, who observes, "Nubile virgins, particularly about the menstrual period, as being affected with epileptic paroxysms, apoplexies, and groundless fears and fancies." He attributes these to a congestion about the heart and diaphragm. "When these organs are oppressed, rigors and feverishness supervene; the patient raves about the acute inflammation, cries out on account of putridity, is terrified and anxious on account of her dimness of vision, and from the oppression about the heart thinks suffocation is pending. The mind is harassed by anxiety and weakness, and becomes diseased. The patients call out in great alarm, desire to leap down or throw themselves headlong into pits, and order themselves to be strangled, as if it were a thing beyond all others to be desired. Specters haunt them, and they earnestly long for death as for a pleasure. The disease is easily cured if nothing retards the flow of the menses." He adds: "To those young females affected by it, I recommend that they marry as quickly as possible; for if they conceive, they will escape the disease. Spinal and abdominal tenderness, tympanitis, aphonia, syncope, etc., were observed then, just as they are at the present time, in such cases."

THE VOICE IN HYSTERIA.

As a general indication of hysteria the changed character of the patient's voice in such cases must be mentioned. This alteration consists in a loss of that peculiar softness and melody which distinguish

the female from the male voice. In hysteria the patient's intonation either becomes more rough and masculine than normal, or else becomes more shrill and piercing or metallic than usual, as well as more rapid in the sequence of its modulations. The hysteric voice is not easily described; but once recognized, it is, I believe, an unmistakable evidence of nervous functional disturbance consequent on some derangement of the utero-ovarian function.

The earlier nervous symptoms that frequently occur at puberty may for a time be unrecognized; but as the local disease progresses, these come into such prominence as in many cases to obscure all the evidence of their physical exciting cause; the most important of these hysterical manifestations are increased nervous susceptibility, or general hyperæsthesia and diminution of inhibitory nerve-force, together with perverted moral or mental excitability, and in some cases actual delusions. This condition is more frequently coexistent with amenorrhœa, or dysmenorrhœa, resulting from uterine disease or displacement, than any pathological increase in its function.

HYSTERICAL INSANITY.

The connection between mental disease and menstrual disorders, more especially amenorrhœa, has been frequently observed by gynæcologists. Thus, in a case related by Pinel, a girl suffering from insanity was placed under his care shortly before the ordinary age of puberty, which passed over without the occurrence of the usual changes connected with this period. After a considerable lapse of years, however, one day on rising from her bed, she ran and embraced her mother, exclaiming, "I am well." The catamenia had just flowed for the first time, and her reason was restored, both the mental and reproductive system thenceforth permanently resuming their normal functional condition.

HYSTERICAL EPILEPSY.

This disease is said to be invariably accompanied with some derangement, and more generally suppression, of the menstrual function.

HYSTERICAL TRANCE.

Hysterical evidences of utero-ovarian disorder connected with the evolution of puberty, may also manifest themselves by diminished nervous activity and general or local anæsthesia; and as well by the opposite condition. To illustrate, as stated by Dr. Badden, "as an instance of so-called hysteric trance: A young lady, recently arrived at puberty, of an hysterical temperament, but otherwise apparently in perfect health, went into her room after luncheon to make some change of dress. A few minutes afterward she was found lying on her bed in a profound sleep, from which she could not be awakened. When I first saw her, twenty-four hours later, she was then still sleeping tranquilly, the decubitus being dorsal, respiration scarcely perceptible, pulse seventy and extremely small; her face was pallid, lips motionless, and

the extremities very cold. At this moment so deathlike was her aspect that a casual observer might have doubted the possibility of the vital spark still lingering in that apparently inanimate frame, on which no external stimulus seemed to produce any sensorial impression, with the exception, however, that the pupils responded to light. Sinapisms were applied over the heart and to the legs, where they were left on until vesication was occasioned, without causing any evidence of pain. Faradization was also resorted to without effect. In this state she remained from the evening of the 31st of December until the afternoon of the 3d of January, when the pulse became completely imperceptible, the surface of the body was icy cold, the respiratory movements apparently ceased, and her condition was to all outward appearance undistinguishable from death. Under the influence of repeated hypodermic injections of sulphuric ether and other remedies, however, she rallied somewhat, and her pulse and temperature again improved. But she still slept on until the morning of the 9th, when she suddenly woke up, and, to the great astonishment of those about her, called for her clothes, which had been removed from their ordinary place, and wanted to come down to breakfast, without the least consciousness of what had occurred. Her recovery, I may add, was rapid and complete.

"In the second instance of the same kind that I have seen, the patient, after a lethargic sleep of twenty-seven days, recovered consciousness for a few hours, and then relapsed into her former comatose condition, in which she died."

I have referred to the foregoing cases, occurring in one physician's experience, as disproving the general opinion that hysterical lethargy, or trance, is so rarely met with, and is then of such trivial pathological importance as to be of little if any practical interest. On the contrary, from my own experience I can vouch that these conditions are of far more frequent occurrence than is generally supposed to be the case, as well as for the fact that all the ordinary external signs of apparent death may occasionally be thus counterfeited with wonderful similitude. I would, therefore, take this opportunity of urging the necessity of bearing this in view, so as to avoid what I fear is the not infrequent possibility of living interment in some cases of too hurried burial under such circumstances,—a calamity the horrors of which, I may here repeat, no effort of imagination can exaggerate, and for the prevention of which no pains can be excessive and no precautions superfluous.

HYSTERICAL PARALYSIS.

In many instances the nervous symptoms of utero-ovarian functional disturbance at the period of puberty may also be manifested in the simulation of every form of paralysis, from the most trivial local loss of power to complete paraphlegia.

MENSTRUAL DISORDERS OF PUBERTY.

The normal course of the evolution of puberty is especially liable to derangements arising from the various morbid conditions by which the due performance of the function of menstruation may be interfered with. This disturbance is most frequently occasioned by amenorrhœa, or the total absence or diminution of the catamenial discharge; secondly, by dysmenorrhœa, or the difficult and painful accomplishment of this function; and thirdly, and less commonly, by menorrhagia, or abnormal activity in the utero-ovarian changes connected with ovulation, and consequent excess in the resulting menstrual discharge. The effects of these disorders are more marked during puberty than perhaps at any subsequent epoch; but inasmuch as their occurrence is by no means restricted to this period, it would be beyond the scope of the present article to attempt any discussion of their general pathology and treatment.

With regard to the first named of these disorders, viz., amenorrhœa, it may, however, be here observed that very undue importance is commonly ascribed to the non-appearance of menstruation at the usual age, or to its subsequent interruption or diminution, as the supposed general cause of nearly all the ills to which all female flesh, about the period of puberty, is heir. In the great majority of the cases of amenorrhœa, for which at this epoch we are so frequently consulted by anxious mothers, the functional irregularity is merely symptomatic of systemic morbid conditions, to the rational treatment of which, by appropriate constitutional remedies, rather than to any futile if not injurious utero-ovarian or local stimulation, the efforts of the physician should in such cases be directed.

Dysmenorrhœa is hardly less frequently associated than amenorrhœa with the special hysterical and other constitutional disorders incidental to puberty. Under these circumstances, difficult menstruation, although occasionally resulting from uterine flexions or displacements, or from stenosic or other obstructive causes, as well as from local inflammatory conditions, is far more commonly merely a complication of coexisting general nervous disorders or constitutional hyperæsthesia, on the cure of which the dysmenorrhœal trouble will at once subside.

In this connection I may add a note of warning against the popular custom, so prevalent among all classes, of treating the dysmenorrhœa of puberty by wine or brandy or whisky. From long experience I am convinced that intemperance in women may very frequently be traced back to the first painful menstrual period, when alcoholic stimulants are often forced on the young sufferer. The pain of dysmenorrhœa being thus relieved, the girl at the next similar epoch naturally and no longer reluctantly seeks the same solace, until in this way the victim of dysmenorrhœal alcoholism may gradually become an habitual and perhaps an incurable drunkard. Instead of giving spirits of any

kind, give a cup of hot ginger tea, and place a hot-water bag over the seat of pain and a hot-water bottle at her feet, and they will afford immediate relief.

Chlorosis—or chloronæmia, as green sickness is more properly termed, which we have already alluded to in diseases of women, to which we refer at greater length in this article, as it is one of the special ailments of puberty—is the most frequent of all the morbid conditions specially incidental to this time of life. Chlorosis, or green sickness, may be regarded as a specific form of anæmia; the ganglionic nervous system, as a rule, is connected with either amenorrhœa or dysmenorrhœa. The history of the disease, its symptoms, and the line of treatment by which these may be relieved, all point to the accuracy of Kuchenmeister's conclusion, viz., "that the essential cause of the chloritic condition is the retention of carbonic acid in the blood." This theory is sustained by the fact that the chlorotic are very commonly persons of the poorer classes, who, while subsiding on poor food, have been deprived of fresh air, sunlight, and exercise, and in whom, from the consequent diminution of pulmonary exhalation, aided by the lessened menstrual evacuation in such cases, the blood is surcharged with carbonic acid as well as poor in red corpuscles.

Chlorosis is characterized by a universal and decided debility of the whole frame, with sometimes a degree of torpor of particular organs. The cutaneous surface is of a sallow or slaty pallor, though the skin may be deadly white without a greenish tinge. There is a general weakness of the muscular system, and weariness and languor of body, with listlessness of mind, the patient being indisposed for any exertion, easily overcome by fatigue, nervous, low-spirited, and frequently a prey to singularities of temper. There is generally severe recurrent headache or vertigo, and sometimes an impaired state of the memory and of the faculty of attention; the sleep is disturbed, the chlorotic sufferer being either preternaturally wakeful or abnormally drowsy. The eye, in well-marked cases, is dull and heavy; the lips and tongue are at first exsanguine and pallid, and subsequently present a peculiar slaty hue. The temperature, more especially that of the extremities, is depressed. The pulse is small and weak, often rapid, and easily fluttered; there is frequently palpitation, recurring in attacks, or of a more permanent character; more frequently still there is a sense of sinking in the præcordia, with irregular action of the heart, or imperfect syncope. There is usually a degree of breathlessness experienced on any exertion, sometimes fits of dyspnœa, sometimes a sonorous cough. The appetite is normal; occasionally it is morbidly increased, but more usually anorexia is present, and the patient loathes food, or is sick after eating, or much troubled with flatulence and gastrodynia. Often there is a desire for indigestible substances, particularly chalk, magnesia, or even cinders. The writer had one patient who had an uncontrollable desire for eating slate-pencils, and carried one in her dress pocket so that it would

be convenient for her to taste it when the desire came on her. The bowels are costive, often obstinately so, or if not, the stools are dark and offensive. The abdomen is not infrequently tumid, swollen, and variable in size. The hands and feet swell at night, with œdema of the eyelids, if not of the whole face, particularly in the morning. The urine is scanty, though clear.

In addition to the above symptoms, many other of those obscure symptoms which in girls are so frequently met with about the time of puberty may also be found connected with chlorosis. Of this kind is that severe left-side pain, otherwise inexplicable, so often complained of at that age, as well as those intense nervous headaches, breathlessness, and, in fine, that host of hysterical symptoms by which all the features of organic and functional disease, whether pulmonary, gastric, or cardiac, may be simulated.

Treatment.—With regard to the treatment of chlorosis, I will repeat that our attention should be primarily directed to the rectification of that error of digestion which is a chief cause of the characteristic aglobulism, and, secondly, to the depuration of the vitiated blood by the excretory organs, rather than, as is too often done in such cases, to the restoration of the catamenial discharge, the suppression of which should be regarded as merely a symptom—albeit a primary and most important one—of the constitutional disease.

In accordance with this view, the rational treatment of chlorosis must be approached by means capable of strengthening the general system, and more especially improving the tone of the organs of digestion and excretion. For the first purpose, open-air exercise, free exposure to sunlight, and suitable food are more essential than any medicine at our command. We would, then, recommend regular exercise proportioned to the ability of the patient; the use of warm or tepid salt-water baths every day, succeeded by friction with dry flannel or a soft brush; sufficient clothing, and particularly a flannel dress; a nourishing and digestible diet; the administration of bitter and tonic medicines in varied forms,—preparations of iron, such as chalybeate waters, tincture of muriate iron, or the carbonate of iron, alone or combined with myrrh, or sulphate of iron with quinine, or a grain of iodide of iron in a bitter infusion, and arsenic.

The use of chalybeate mineral waters, internally as well as externally, is of self-evident service in the chlorotic state, unless the patient be of a full habit, in which case purgatives should be used to keep the bowels active.

TUBERCULOSIS AND STRUMOUS DISORDERS OF PUBERTY.

We have discussed, in the preceding sections, the most important of the special disorders directly connected with the organic and functional evolution of the reproductive system; we must now briefly consider some other forms of disease to which the period of puberty is especially liable, even although their occurrence is not limited to this

age, and their etiology must in some instances be sought in causes operating at an antecedent epoch. Of these maladies the most important in this connection are the various forms of strumo-tuberculous complaint, which constitute so large a proportion of the disease of puberty, which we so often find in our daily work. According to statistics, the disease is notably increasing all over the country, from east to west, from north to south. It is thought that the explanation of this fact must be looked for in circumstances preceding the development of puberty, and is mainly referable to the dietetic and hygienic mismanagement of childhood, more especially to the frequent employment of unsuitable condiments, such as tinned and other artificial so-called milk preparations as substitutes for the natural food essential for the healthy nutrition of children in early life.

The acute forms of tuberculosis which are most common during youth have been observed by Cohnheim and Klebs, who say that they "resemble the infective diseases in their zymotic origin from a specific virus, whether generated in the body from caseous matter or introduced from without. The latter is probably generally the case in the tubercular diseases so common among the children of the poorer classes, into whose dietary tinned or preserved milk now enters largely; for there can, I think, be no guarantee that the cows furnishing this supply are not suffering from perlsucht, or bovine tuberculosis, as the disease is very prevalent, and does not materially affect the quantity of milk."

Regarding the frequency of tuberculosis, Prof. Bollinger (Wiener Medizin Presse, Sept. 16, 1888) maintains that in large cities from forty to fifty per cent of all deaths may be attributed to this disease. Recent experiments in his laboratory show that milk may prove infectious, whether taken from cows suffering with local or from those suffering with general tuberculosis.

As in other infectious diseases, the quantity of tuberculous material introduced into the economy strongly influences the severity of infection. "Only a few drops of undiluted milk from a tuberculous cow proved sufficient to produce typical miliary tuberculosis in animals; but when the quantity underwent any material dilution, its effects were negative." This latter observation would suggest the use of milk taken from many cows, rather than from one cow.

Another cause of the increasing frequency of scrofulous and tubercular disorders is the physical deterioration of our people, arising from that widespread intemperance, which is said to be almost as general among the cities and large towns as it is among men, and the consequent toxicological effect of alcoholism on the wretched offspring of these drunken parents, who further pay the penalty of their progenitor's excesses by the development of scrofula and tuberculosis as the result of semi-starvation and neglect during the first years of life.

It would be impossible to consider here so wide a question as the relation of scrofula to tuberculosis. Some eminent writers, Dr. Bad-

den, Klebs, and others, say that the scrofulous diathesis is the prolific and primary source of all tuberculous disease, whatever part of the body may be thus affected, whether it be the lungs, the meninges or substances of the brain or spinal cord, the mesenteric glands, the cancellous structure or articulating surfaces of the bones, or the external glandular system.

One of the most frequent forms of pulmonary tubercular disease, as the old writers well termed it, is the "acute or galloping consumption." In some instances we have seen miliary tuberculization of the lungs pass through all its stages, from its first recognition until the patient's death, within a few weeks, or in a month's time. The rapidity of the race toward death, and the accompanying similar tubercular infiltration of the meninges and substance of the brain, peritoneum, liver, etc., in such cases, leaves little room to question the fact that acute tuberculosis is essentially an auto-infective disease. Within the last few years a new light has been thrown on the causes and method of development of tubercular disorders, concerning which, until recently, the views of Buhl as to their origin from autoinoculation with caseous matter in the body were generally accepted. This doctrine has been disturbed by the discovery by Koch of the specific bacillus of tubercle, and by the more recent researches of other pathologists in the same direction, which enable us in some measure to understand the extraordinary rapidity with which pulmonary tuberculosis too often supervenes on an attack of broncho-pneumonia, particularly in strumous patients at the age of puberty. Nor is it to be wondered at if, in children thus previously enfeebled by diathesis, the struggle for existence between the specific micro-organisms of disease and the colorless blood-corpuscles or leucocytes, should so speedily result in favor of the almost incredible rapidly-multiplying bacilli, which have been so graphically described by Dr. Latham and by Metschinkoff.

Treatment.—It is said by eminent authors that, be the pathogenesis of tuberculosis what it may, there can be no question of the fact that the disease is most generally developed at puberty in the patients of an otherwise evidently strumous diathesis, and that its primary predisposing cause is generally traceable to malnutrition, general or local, in such cases. Under these circumstances, and bearing in mind the facts ascertained by recent investigations just referred to, it is obvious that our primary therapeutic efforts should be directed toward endeavoring so to enrich or improve the condition of the circulating fluid as to increase its capability of resisting and destroying the micro-organisms by which tuberculosis is developed, and that for this purpose we must seek to rectify any existing error of nutrition that may result from defective nutriment, as well as from impaired powers of digestion and assimilation. These indications should be borne practically in view in the selection, for such patients, of a dietary not only easy of digestion and assimilation, but also specially rich in those elements needed to strengthen the constitution against the inroads of

the prolific micro-organisms by which tuberculosis is developed. The arrangement of that dietary must, however, be so largely controlled by the circumstances of each case that it is impossible to lay down any general directions on this point. I may, however, observe that some of the special requirements in this respect of strumo-tubercular youth are to a large extent supplied by the food-medicines with which modern polypharmacy has now armed us for the struggle with tubercular disease, wherein pharmaceutic remedies must be assigned a place entirely subsidiary to hygienic as well as dietetic management, by articles such as cod-liver oil, maltine, and the various preparations of malt.

Prophylaxis of tuberculosis may be either from the point of view of the individual already suffering, or from that of the person free from the infection. In order to prevent the patient from becoming a center of infection and also to diminish the possibility of re-infection of himself or herself, the tuberculous person should destroy by burning or boiling all discharges from diseased parts, whether such parts be internal, as the lungs or bowels, or external, as open glands or joints. Local cleanliness is essential, and in phthisis it is important that the sputa be not swallowed, but expectorated and immediately destroyed. Portable spit-cups are in the market, or small pieces of rag may be used, put in a special receptacle, and finally burned.

Tuberculous subjects should not sleep in the same bed with another person, and absolute cleanliness of the person should be enjoined. The occupied apartment should have a hard-wood floor, with mats instead of carpets, and should be thoroughly scrubbed at short intervals. If these precautions are observed, and if the apartment is at all times well ventilated, the risk involved in nursing a consumptive will be very slight to a healthy person. In a family, however, in which the tendency to tuberculosis is strong, the risk is appreciable.

From the point of view of the non-infected person with an hereditary tendency to the disease, there are two desiderata: First, to increase the nutritive powers of the tissues; secondly, to avoid infection with bacilli. Of these the most important is the first mentioned, at least if the individual is to live within the confines of civilization, since the tubercle bacillus is so universally present as to make escape from it hopeless. At the same time it is important to avoid inoculation as far as possible, and the person who has a strong hereditary tendency to tuberculosis should shun unnecessary exposure to the contagion; thus a physician should not take a resident position in a consumptive hospital; a nurse should decline tubercular patients. There can be no doubt that, especially in our large cities, there are houses and rooms in houses which are infected with the bacillus of tuberculosis. A person with lack of resistive power should never live in a room or even in a house which has been occupied by a tubercular patient, unless such apartment or house has been cleansed and disinfected in a most thorough manner.

The child with hereditary feeble resistive powers should, from the beginning, be brought up with the purpose of developing the muscular and circulatory system, and of obtaining that vitality which is given by continuous life in the open air. At the same time it must be carefully guarded from the various infectious diseases, especially such as measles, which have a tendency to provoke catarrhal inflammations, and it should be continually watched to prevent the development of mucous-membrane catarrhs, which, experience has shown, have a pronounced tendency to aid in the development of tuberculosis. Obstruction of the nose and throat by malformations, adenoid glands, or enlarged tonsils should be promptly relieved by surgical or other treatment, or by the galvanic current of electricity. The clothing should be warm, woolen in winter; it is the height of folly to attempt to harden a child by insufficient clothing and exposure. Habitual cold bathing is excellent in some cases. The food should be abundant, simple, and nutritious, largely but not altogether farinaceous, with a full supply of milk, and, if possible, of fats. Almost invariably the child can be brought to like cod-liver oil, and advantage is gained by making this fat an habitual article of diet in cold weather.

In selecting a climate the question of degree of temperature is said to be a minor one; that of moisture and equability of temperature is dominant. A dry, equable climate is always preferable. Dry cold is said not to be dangerous, and is preferable to enervating warmth.

Prolonged life in high mountainous regions during childhood, if associated with habits of exercise, has a tendency to develop the lungs and heart, and is very beneficial. When there is any failure in the chest development, gymnastic exercises directed to the development of this part of the body may be very useful; but no indoor exercise will take the place of outdoor work, and it is not probable that any artificial system is better than, or even equal to, the natural gymnastics of an active child. Running up and down mountains, herding goats and sheep, following the chase, fishing in mountain streams,—these are the methods of restoring vitality to an exhausted family stock. It is affirmed by recognized authorities that a long-continued life at a high altitude so greatly increases the respiratory movements as to cause dilatation of the air-vesicles and a permanent increase in the size of the chest, which is a great disadvantage when such persons attempt to live at the sea-level. If this be correct, it constitutes no reason against bringing up the hereditary feeble upon the mountains, but is a strong one for keeping them there during their after adult life. The outdoor life is the one dominant feature; this must be insisted on when the individual is forced to take what he can get, not being able to get that which is best.

Returning now to medicinal treatment: Cod-liver oil, small doses of arsenic, creosote, carbolic acid, and other drugs, have been administered by the mouth; but they seem to have no specific action on the tubercular bacillus. "At one time extraordinary hopes were excited by

the publications of Koch,—hopes which were, however, entirely beyond (as it has proven) what ought to have been reasonably expected from Koch's own assertions."

At present we have no known method of directly attacking the bacilli in internal tuberculosis. The indications in the treatment of local chronic forms of the disease are, first, to increase the general nutrition and the resistive power of the individual, and reduce local irritation and changes produced by the bacillus at the seat of infection, and to combat constitutional symptoms as they arise.

THE SUBJECT IN THE EARLY STAGES OF THE DISEASE.

Parents should seek a climate high and dry, live out-of-doors, and sleep in a tent during the warm weather. The food should always be simple, thoroughly well cooked, palatable, the most nutritious and digestible that can be obtained, with a fair proportion of farinaceous articles, very little sugar, and a large amount of fats, as fat mutton chops, cream, cod-liver oil, etc. Drink plenty of milk—no tea or coffee allowed; but the patient may drink chocolate. It is, however, a matter of the utmost importance not to overfeed the patient,—that is not to give more food than can be digested. Sweet-oil can often be taken when cod-liver oil does not agree. Alcohol—good whisky—may be considered under these circumstances as a food, and is of the greatest value. Taken in large quantities, however, it is said, it becomes a deadly poison, but taken in tablespoonful doses, with a raw egg, three times in twenty-four hours, it is very useful. When the digestion is strong, malt liquors are often preferable to spirits; but when the digestion is feeble, whisky or brandy is preferable. Both for physical and moral reasons, the alcoholic drink should always be given with the food as a medicine, and the impression should be made on the young mind that spirits are used as medicines only when it is advisable to do so. A child may be given a half an ounce of cod-liver oil in a dessertspoonful of whisky after each meal; an adult may use half an ounce of brandy or whisky with the same amount of cod-liver oil after each meal. It is essential that the patient be instructed (if she is an adult) never to use stimulants against the ever-recurring feeling of exhaustion. Take a cup of hot milk, and lie down until the feeling of exhaustion is passed over.

In prescribing exercise, the point to be borne in mind is that the exercise should be regular, day after day, with no paroxysms of excess, to be followed by hours of exhaustion. It should never be violent, but continuous; it may be adapted to the individual needs in developing the chest or other parts, but always should be, if possible, in the open air, and always be kept within the strength of the patient. Slight tiring, producing quietness and sleep, is advantageous; excessive tire is injurious. Continuous life in the open air is of the utmost importance, even in the advanced stages of phthisis. Life will be protracted and made more comfortable by having the bed of the patient on the porch from

sunrise to sunset, or in the open air under the shade of the trees, or under a canvas or tent, if the temperature is suitable.

Patients who are past helping should remain at home unless they have friends to whom they can go in a suitable climate; but the consideration of exposing an uninfected household to the disease should be thoroughly discussed, and also how to prevent the disease from becoming infectious in the household, as has been heretofore described.

The climate in the eastern United States is that of the Adirondacks; Florida is said to be too damp, enervating, and malarious in most of its parts for the ordinary case of incipient phthisis. The high sand ridge in the center of the state is best situated, so it is said, but is probably inferior to the pine district of southern Georgia. The high mountainous districts of North Carolina rank next to the Adirondacks, and are even superior in those cases in which there is a tendency to feebleness. If a patient feels the cold of the Adirondacks, Asheville is preferable; or the winters may be passed in Asheville and the summers in the Adirondacks. Southern California in some of its parts is undoubtedly a good climate, but it is thought or believed to be inferior to the central tract in the United States, commencing in San Antonio, Texas, and running to Colorado and Arizona.

The height of the locality above the sea-level is a serious consideration to the consumptive. Although individual peculiarities here, as elsewhere, are important, the majority of tubercular patients will do best at a height of from three to six or seven thousand feet above the sea. Among the modifying influences in regard to altitude is the tendency of the patient to hæmoptysis; when this exists, a rapid ascent to a considerable height greatly increases the danger of bleeding. It is, though, probable that this is due to the extension of the air-vesicles by the increased efforts at respiration produced by the altitude. The very cause of the benefit of the altitude becomes the source of danger; therefore, hemorrhagic cases should begin their life in the arid tract at a low elevation. Again, in the northern portion of this region, and especially in the higher elevations, the cold is severe in winter; on the other hand, in the San Antonio region the summer heat is excessive. The selection of a climate depends upon the character of the case and the season of the year. In the winter it is usually preferable to send the patient to the southern portion, and travel northward with the seasons, so that the following winter can be spent in the high and colder districts.

It is of the utmost importance in a case of consumption to maintain the integrity of the digestive apparatus, and in selecting the place of abode the possibility of getting properly-cooked food suitable to the individual case is of importance. Further, what may be termed extraneous considerations often enter into the problem of choice of locality. Very frequently the opportunity for making a living, if not in the immediate present, in the near future, is of vital importance.

In Texas, Southern California, Colorado, Wyoming, and other

localities, ranch life, or the cultivation of the soil in some way, is open to many, and gives work in the open air. In other cases the attractions of a city like Denver are dominant. The altitude of San Antonio is 6,500 feet; of Santa Fe, which may be looked upon as the next important stopping-place, 6,840 feet; of Denver, 5,196 feet; of Colorado Springs, 6,000 feet.

Professor C. B. Penrose, of the Medical Department of the University of Pennsylvania, spent two years roaming over this arid district, and states as the result of his personal observation that a greater proportion of cases get well in New Mexico than in any other western territory or state. The question of the return of the apparently cured patient to his home is always a very serious one; in the majority of cases permanent residence in a proper climate is most essential.

Under the second indication—namely, the reduction to the minimum of the local irritation and changes produced by the bacteria—may be considered the use of, first, certain pulmonic gymnastics; second, counter-irritation; third, inhalation, galvanic current of electricity; fourth, internal medical remedies, which have already been mentioned.

In cases of incipient phthisis the inhalation of compressed air in the so-called "pneumatic cabinet" gives good results, which are probably produced by a distention of the air-vesicles. It would seem that the results of such inhalations would be inferior to those produced by high elevations, and they should be used with great caution where there is a tendency to hemorrhage.

Counter-irritation is often of value in phthisis pulmonalis; it combats the local inflammation, but not the bacillus. Croton-oil is prescribed in the early stages of the disease. When a small amount of tuberculosis in the apices produces much irritation, with catarrhal-pneumonic consolidation, the continuous use of croton-oil over the upper part of the chest may be very serviceable.

Sinapisms, or dry cups, when there is congestive exacerbation, blisters in time of acute pleurisy, liniment of chloroform and oil of peppermint when there are neuralgic or muscular pains,—these are very useful when judiciously employed.

The galvanic current of electricity, applied through the tonsils and through the bronchials, as has already been prescribed (see article on the treatment of bronchial catarrh), relieves the irritable cough of phthisis. The writer has relieved many patients while under her care till they were able to go to a higher altitude.

Sometimes sedative expectorants are demanded by the patient to "loosen the phlegm;" it is necessary, however, to be guarded in their employment, lest the stomach be disturbed. Creosote and guaiacol are valuable remedies, especially applicable to cases with very free expectoration; sulphuretted hydrogen terebene and the various expectorant volatile oils are useful when there is much chronic catarrh or softening. In dry chronic cases with little catarrhal tendency, the long-

continued use of small doses of arsenic (one or two drops of Fowler's solutions three times a day) may be very advantageous.

In any case of consumption it is a matter of vital importance to study carefully the digestive organs, to adapt the food to the individual needs and condition of the patient, and to treat any symptom of digestive failure very carefully as soon as it manifests itself. A catarrhal state of the stomach and bowels must be met at once by appropriate remedies. In the advanced stages, not only comfort but also distinct advantage is sometimes obtained by a system of forced feeding, consisting of a daily lavage (washing out of the stomach), followed by an injection into the stomach of quantities of nutritious, concentrated, easily-digested foods. In some cases, in children more than in adults, free inunction with cod-liver oil seems to aid in the prevention of emaciation.

When hæmoptysis occurs, the patient should be put to bed and forbidden to talk or to make any exertion whatever. Opium should be given to allay nervous excitement and erethism, which are almost invariably present, and to quiet a cough if it should exist. At the time of the hemorrhage the taking of a large dessert-spoonful of fine table salt into the mouth is sometimes effective in checking the bleeding. A thick flannel may be laid over the seat of the bleeding, if it is apical, and an ice-bag about half full of pounded ice over the flannel; or a towel may be wrung out of very cold water and applied in the same manner; then cover the patient so she will not feel cold. If the case is severe, fifteen grains of extract of ergot with ten minims of glycerin and twenty minims of water, may be given by the stomach, and it should be administered hypodermically as well. As ergot is an entirely safe remedy, it should be exhibited in large doses. If there is a call for immediate haste, two to four fluidrachms of the fluid extract may be exhibited at once. Afterward the solid extract should be administered in capsules, as less apt to disturb the stomach; from ten to twenty grains (equivalent to five times the amount of the fluid extract) may be given every hour to two hours, according to the degree of the emergency; not more than an ounce of the fluid extract of ergot should be taken in the twenty-four hours. Gallic acid, which the writer had given in capsules, ten grains every two to four hours, was very efficacious in one case of hemorrhage; oil of erigeron, ten minims every one to four hours, is said to be good for hemorrhage. It is a good plan to alternate some of these remedies with ergot. If there is excitement of the circulation and a full bounding pulse, aconite tincture should be administered. Stimulants, such as alcohol and digitalis, in some imperative cases have to be resorted to, but they must be very cautiously used, lest by increasing the force of the circulation they aggravate the hemorrhage. The older remedies, such as sulphuric acid, plumbi acetate, oil of turpentine, are of very inferior rank to those above noted.

Night sweats may occur in the daytime, as sweating is in no way peculiar to phthisis. The antihydrotic drugs of value are atropine,

extract of ergot, agaricin, gallic acid, and sulphuric acid, named in their order of power and general applicability. Of these, atropine has the disadvantage in producing great dryness of the mouth and throat and disturbance of circulation if given in full doses; it should be given in only one-fourth to one-half doses till the sweating is under control during the daytime; and if there is no day sweating, about two-thirds of a dose may be given at bedtime, which will usually stop the drenching perspiration.

From one one-hundred-and-fiftieth of a grain to one two-hundredth of a grain may be given once during the day; or, if the extreme sweating exists, the small dose may be given every six hours till relieved of the sweating. At bedtime from one-hundredth to one-sixtieth may be given, provided there is excessive sweating; otherwise give the smaller dose at bedtime also. Extract of ergot does no harm to the patient, unless it may disturb digestion, and it may be administered in five-grain capsules every four hours during the day. In extreme cases ten grains in capsules may be given for one dose every four or six hours during the day, as its action is not immediate, like that of atropine, but rather continuous. Agaricin is said often to be very efficacious given in capsules (three to five grains) every six hours; it has some tendency to irritate the intestinal canal, but otherwise it is said to act purely as an antihydrotic, exerting no possible influence upon the system. Bathing the patient at bedtime with alcohol will aid the above remedies in checking the sweating. After the sweating the body temperature is lowered; frequently it is subnormal. Care should be taken in changing the clothing to see that the patient is rapidly dried with a soft, warm towel, and to have the fresh underclothes warm beforehand, and everything in readiness before commencing to rub the body with warm alcohol. Cover each part of the body as it is bathed with clean, warm towels, not allowing the patient to be exposed to the temperature of the room (which should, however, be not less than 80 to 90 degrees in the winter time, and not less than 70 degrees temperature in the summer time); and should the patient have a tendency to chill, give two-thirds of a dose of atropine before commencing to bathe the patient; this will prevent chilling. Sometimes a tablespoonful of whisky, administered just before commencing to remove the wet underclothes, will prevent chilling; and if a capsule of quinine (two grains) is administered with the whisky, providing the body temperature is below normal, it will act very beneficially. Quinine is not effective in consumptive cases, except in cases complicated with malaria, which your family physician will direct. When all is ready as above advised, go through the process of bathing, etc., as quickly as possible. No talking should be allowed while the patient is being bathed, as time is lost in talking, and the patient is being exposed to cold; do it quickly, so as to avoid the danger of taking cold.

The combating of the hectic fever in phthisis is often hopeless. The moderate use of antipyrine, or phenacetine, is sometimes advan-

tageous; but never employ large doses if small ones fail, because of their tendency to produce depressing sweats. When the temperature is high (103 degrees Fahrenheit) a cold sponging or a tepid sponging may be employed.

The writer had one case of laparotomy performed by Dr. S. H. Buteau, of Oakland, California, expecting to find a neoplasm of some kind; and behold, we found one mass of tuberculosis. Everywhere the tubercles could be seen; they were peeled off, and (they resembled a graham gem broken open) rolled out from the peritoneum in masses, other physicians witnessing the operation. In the left ovarian region the tubercles had become broken down, which was causing the continued fever the patient had had for weeks and even months before she applied at my sanatorium in Oakland, California (Lakeside Sanatorium), for treatment. Suffice it to say, the operation was a success in every particular. However, for about four weeks the patient had a very high temperature, ranging from 102 degrees Farenheit morning temperature to 105.7 degrees in the afternoon, with not very much variation of the temperature. Though the patient's digestion was fairly good, an abundance of fresh milk and eggs was her principal nutriment. In nine weeks the patient was sent home. This was five years ago; she has since married, and has a fine, healthy-looking boy. I will add that Dr. Buteau first closed the wound; but it did not heal, and a drainage tube was put in, and the peritoneum was flushed out daily with peroxide of hydrogen, then with sterilized water till healing was complete. The writer thinks that laparotomy should be resorted to in all cases of tuberculosis of the peritoneum.

The treatment of *intestinal tuberculosis* must have for its basis the general hygienic management and treatment already specified for chronic tuberculosis. Bismuth with carbolic acid, creosote triturates (J. Wyeth & Bros.'), chalk mixture containing tannic acid, lead acetate, silver nitrate, and other suitable remedies for the relief of intestinal catarrh and for the checking of diarrhea when it becomes severe, must be used to suit each individual case. Opium is valuable in many cases. Externally turpentine stupes, spice plasters, and all the milder counter-irritants may be employed upon occasions. The galvanic current of electricity gives comfort to the patient. Make the positive pole active, place the negative over the spine, and give through the bowels daily, or every other day, as strong as the patient can bear it with comfort, usually from fifty to eighty milliamperes. Seance from fifteen minutes to half an hour. It may be moved about over the bowels where there is tenderness, giving from ten to fifteen minutes' time to each movement of the electrode.

Iodide of iron especially for children in cases of catarrh of the bowels (I will add here that all the above-prescribed doses for consumptive cases are for adults, and children must be given the remedies according to the age and constitutional diathesis of the child) is said

to be very valuable. The most recent method of treatment is by laparotomy.

Tuberculosis of the kidneys, bladder, prostate glands, seminal vesicles, testes, mammary glands, lymph glands, bones, and joints all are considered to be surgical disorders, especially to be treated by radical local measures when possible. The constitutional management of such cases is similar to that of chronic internal tuberculosis.

In lupus or in scrofuloderma, electrolysis has been used to a considerable extent with good results when the patches are small.

GENERAL HYGIENE AND CULTURE OF PUBERTY.

It would be difficult to overestimate the practical importance of the physico-moral management and training of "the springtime of life," as this epoch is aptly termed; for within its limits must be implanted the fructifying seeds of health, mental, moral, and physical, by which alone the future well-being of the individual may be assured; or, on the other hand, will then be sown the no less potent morbific germs, by whose development the sanitary integrity of mind and body must eventually be impaired or destroyed.

The pathological influence of the course of puberty of some of the latter agencies was well described by Dr. James Johnson, of London, in his "Economy of Health," in which he says: "In this stage of rapid development, corporal and mental, the greatest difficulty is experienced in preserving the *physique* within the bounds of health, and confining the *morals* within the limits of virtue. How many minds are wrecked, how many constitutions ruined, during the third septennial! At so early a period of life, when passions so predominate over principles, it is hardly to be expected that the force of precept can be so efficient a preventive as the fear of bodily suffering. If the youth of both sexes could see through the vista of the future years, and there behold the catalogue of afflictions and sufferings inseparable attendants on time and humanity, they would pause ere they added to the number by originating maladies at a period when nature is endeavoring to fortify the material fabric against the influence of those that must necessarily assail us in the progress of life. Yet it is in this very epoch that some of the most deadly seeds of vice and disease are implanted in our spiritual and corporeal constitution,—seeds which not merely 'grow with our growth and strengthen with our strength,' but acquire vigor from our weakness and obtain victory in our decay. This melancholy reflection is applicable to all classes and both sexes. The sedentary and insalutary avocation to which young people of both sexes in the middle and lower classes of society are confined, between the ages of fourteen and twenty-one, occasions dreadful havoc in health and no small deterioration of morals.

"The drudgery, scanty clothing, bad food, and exposure to the elements, of our laboring or factory population, as well as the still greater

miseries of the too numerous unemployed poor in these countries, are but little more injurious to health and life than the sedentary habits, unsanitary surroundings, and depressing passions of the various species of artisans, mechanics, and shopkeepers in the classes immediately above them. The infinite variety of new avocations among these grades has given rise to a corresponding infinity of physical and moral maladies, of which our forefathers were ignorant, and for which it requires much ingenuity at present to invent significant names. The incalculable numbers of young females confined to sedentary avocations from morning to night, and too often from night till morning, become not only unhealthy themselves, but afterward consign debility and disease to their unfortunate offspring. It is thus that infirmities of body and mind are acquired, multiplied, transmitted from parent to progeny, and consequently perpetuated in society. He would be blind indeed who did not perceive the outward working of the causes in our own day. Nations are only aggregations of individuals, and whatever be the influence, whether good or evil, that operates on a considerable number of the population, that influence will radiate from ten thousand centers, and diffuse its effects, sooner or later, over the whole surface of the community."

In viewing the ascending links of society at this present time, there is no great cause for congratulation. The youth of both sexes, doomed to the counter, the desk, and the schoolroom, are little elevated, in point of salubrity, above their humbler contemporaries. It is during puberty that the destiny of youth is fixed for all the various professions and pursuits, into the training for which the young are now too often prematurely forced by the increasing exigencies of the struggle for existence, wealth, or distinction in all densely-crowded centers of population. What wonder, then, that under such circumstances the intellectual advantages thus secured are too dearly purchased at the expense of health? The physical stamina as well as the mental powers are too frequently thus so overstrained in this fierce competition that both thereby become prematurely exhausted, and if not permanently at least temporarily debilitated and incapacitated for their ordinary functions. These results are, moreover, very commonly consequent on errors in the mental or physical training of children in the period immediately antecedent to puberty, the result of which, being manifest at this epoch, must be here referred to.

"The mental training or education [quoted from Dr. Badden] of youth during early puberty is a question always of great importance, but of special interest at the present time. We are all, of course, agreed as to the duty of suitably educating the young, so as to fit them for the daily-increasing requirements and competition of modern life; but as to the extent to which this should be carried out in early childhood, there is, unfortunately, a great discrepancy between the doctrinaires of the educational department and the views of those who have a knowledge of the laws of nature, or who, as physicians, have to deal in

disease, with the consequences of their violation. The 'red-tape officialism' of the former is often supreme over medical experience. And, hence, whilst children, before the age of puberty, are thereby overworked into disease or death, the physicians must still raise their protesting voice.

"The first years of life should be mainly occupied by moral and physical training, and during this period the amount of mental cultivation which a child's brain is capable of receiving with permanent advantage is much less than is commonly believed. No greater physiological mistake is possible than the prevailing idea of attempting any considerable degree of mental culture until sufficient development of the physical stamina and moral faculties is accomplished. The organs of the mind are as much a part of the body as the hands and feet, and ere either can function properly, its vital force must be developed and maintained by nutrition. Hence arises a very important practical question in connection with compulsory elementary education. A large proportion of those who must come within the provision of the law in most cities are ill-fed children of the poorest classes, and are those with whom for the past sixteen years we have had to deal daily in the hospital for sick children. As a matter of fact, we may accordingly observe that children thus debilitated by privation are necessarily as much incapacitated for any mental strain as they are for the accomplishment of any feat of physical strength, and that it is as inhuman, injudicious, and impolitic to expect the former as it would be to look for the latter from those so circumstanced.

"If, therefore, the state, for reasons of public policy, determines that all children shall be compulsorily educated from the earliest years, it should certainly afford the means by which this may be least injuriously and most effectually carried out by providing sufficient food, as well as education, for every pauper child compelled to attend school."

Among the results of overpressure in schools referred to in Sir Crichton Browne's admirable report on the subject, are "cerebral diseases in all forms, viz., cephalitis, cerebritis, meningitis, as well as headache, sleeplessness, neurosis of every kind, and other evidences of cerebro-nervous disorders. It would be difficult to overestimate the pathological consequences of thus directing all the available energies of the system to the brain during early youth, to the irreparable injury of the overstimulated cerebral organization, and at the expense of the other functions and organs of the body. Time, however, does not permit of our dwelling on the ill effects of mental overpressure brought under our own observation. We now allude to this subject merely with the view of pointing out the imminence of the danger and the importance of its avoidance."

The deterioration of the physical stamina is thus due, as we may say, mainly to the fact that a large part of the first years of life, which should be primarily devoted to religious or moral as well as physical training, is now given up to the development of the mental powers. The

child is too early compelled to attend some school, where the immature brain is forced into abnormal and disastrous activity. It is to be hoped that the system of kindergarten now so much in vogue in this country, and the wonderful strides which have been made in physical training, even in our elementary schools, will have the effect of reducing the death-rate from cerebral diseases in childhood, and will aid in giving our youths of both sexes sound minds in sound bodies.

ILL RESULTS OF SEXUAL PRECOCITY DURING PUBERTY.

Dr. Badden and others have observed that in no particular are the pathological effects of the killing pace at which the race of life is nowadays too often run, from its start to its untimely finish, more apparent than the premature breakdown of constitutions consequent on the abnormally precocious indulgence or abuse of the sexual instinct or appetite. To these abuses is unquestionably due a large and increasing proportion of the many maladies by which the course of after life is embittered or its duration shortened.

What I particularly refer to are those remote or secondary constitutional effects of precocity which must be familiar to every experienced physician, who, in almost daily practise, may encounter the wretched, cachectic, and mentally as well as physically debilitated victims of early erotic excesses or abuses. To these causes must, we fear, be largely ascribed the failure of physical stamina as well as that nervous hyperæsthetic condition and lamentable lack of mental power and determination of character too often noticeable among youths of the present day, and which clearly mark "the Nemesis of a widespread epidemic of precocious sensuality." The means by which this epidemic may be best mitigated is through the mothers. The women physicians, and women who are ministers of the gospel, need to be awakened to the fact that it does lie within their power to teach mothers that these evils are caused through ignorance of mothers and their indifference to the welfare of their children. They are not watchful to see whether they are moral, or whether they are forming the habit of self-abuse in very early life. As we have heretofore remarked, mothers should teach their children to tell them when they feel uncomfortable about their genitals, and mothers should be vigilant to see that their children are kept clean. Little girls should be washed every night between the labias before they are put to sleep, thus preventing any irritation. The mothers should ever be watchful of their children's playmates, whether or not they use immoral language; they should be taught in early life not to associate with bad children. The writer has observed that it is not a good plan for little boys and girls to become intimately acquainted from constant association. Little girls should play by themselves, and little boys likewise. The writer believes that what has been written in these pages is sufficient for all mothers to be profited by it, and that they will look to the very early training of their children against all

immoral vices, each mother in her own special method, as each child has to be approached and instructed according to his understanding, some children being more precocious than others.

As I have said before, in a large majority of cases where little boys form the habit of masturbation, it is due to the lack of proper care in early life. The child may have stricture of the foreskin (phymosis), causing an irritation; hence the habit of scratching is formed, and it is due to itching of the parts. Also so-called "pinworms" or "seat-worms" will cause an irritation in both sexes, also diabetic urine will cause it. If a little boy has stricture, circumcision is the cure. The mother's moral training from birth is the only hope of ever stamping out vice. The purity of a true, loving mother's training is far-reaching, and when she is fully aware of this fact from a scientific standpoint, and each mother is looking to the welfare of her own children, we can see, with the knowledge she has obtained, that in a very few years, vice and immorality will fade away through the means of home training. Dr. Baden says that "the treatment of vice is beyond the reach of the physician, and belongs rather to the domain of the moral teacher or the minister of religion."

CONSEQUENCES OF ABUSES OF ALCOHOL AND TOBACCO DURING PUBERTY.

Another phase of the too common untimely abridgement of early puberty by precocious indulgence in the habits and vices of adult life, is exemplified by the painful results of juvenile drunkenness, daily witnessed, especially among the neglected children of the streets. During, and even before, the first stages of puberty, children are forced into the thoroughfares of our great cities, there to eke out a living the best they can; and the pathological consequences of their acquired or inherited alcoholism are brought under clinical observation in the form of gastric and hepatic disorders and especially cirrhosis of the liver, as well as in the protean forms of cerebro-spinal disease, and the various neuroses which are so frequently noticed in hospitals for children.

The evils thus resulting from the prevailing intemperance of the young as well as the old, should induce us to warn those whom our counsels may influence against the custom of giving alcoholic stimulants to children,—a custom which is so general in its practise and so calamitous in its results. Even in those exceptional cases in which such stimulants may be necessary, we should never sanction their administration save under a guise and in the definite doses of other remedial agents. It is physiologically wrong as well as morally unjustifiable ever to allow a healthy youth to taste alcohol in any form.

With regard to the use of tobacco, authors are agreed that the effects of nicotine are most injurious to youth at the age of puberty. Parents should look after the early training of young boys against the use of tobacco.

SPECIAL HYGIENE AND CULTURE OF FEMALE PUBERTY; ITS PRACTICAL IMPORTANCE.

In a previous section we have described the special functional disorders incident to female puberty, and must now refer to other certain causes of those various nervous and constitutional ailments that are prevalent during this period. Of these causes some, although of a moral rather than of a physical character, are yet so intimately connected with the production and course of the complaints referred to as to demand a brief notice.

Among the subjects thus included in this connection are the influences on female health in puberty of the mental, moral, and physical training or education during, or immediately before, this period; the ill effects of the customary modes of dress and habits and occupations of girls at this time; also the results of premature or abnormal stimulation of the sexual system, whether by too early marital life or in any other way, at that age.

Dr. Johnson says that "female life at any period is fully as good in respect to probable duration, as that of the male, perhaps even a little better." The writer heard an eminent gynæcologist say very recently—one who is accustomed to operating almost daily upon women—"You can't kill a woman; she is like a cat,—has nine lives."

"It is in the period of puberty that the seeds of female disease are chiefly sown, or at least that the soil is specially prepared for their reception and growth. The predisposition to infirmities and disorders of various kinds is affected by acts of omission and commission, in the first class being included the deficiency of healthy exercise of the body in the open air, and of intellectual exercise in judicious studies. The ill results of these are perhaps most apparent among young girls of the upper classes of society.

"The increasing exigencies of modern life, and the desire to render girls accomplished at all hazards, have originated a system of forced mental training, which greatly increases the irritability of the brain, whilst at the same time sedentary employments are followed, frequently as amusements, to the exclusion of active, outdoor exercise. The slow but powerful influence of music, dancing, vivid colors, and odors on the nervous system, but especially on the reproductive system, are quite overlooked. Many more hours of severe application are occupied in the acquisition of pieces of music, which are forgotten as soon as possible after marriage, when music would be least hurtful, or rather, most useful. Dr. J. Johnson very justly asks, "Is it probable that so potent an excitant as music can be applied daily for many hours to the sensitive system of female youth with impunity?"

The same writer points out that "the stimulus of music is of a very subtle and diffusible nature, and the excitement which it produces in the nervous system is of a peculiar character, and one by no means generally understood." Accordingly, any excessive exposure to this

potent stimulation is liable to be productive of some of the various hyperæsthesic morbid conditions of mind and body so prevalent during the period of female puberty. Dr. Johnson says: "Excessive attention given to music in female education is, moreover, indirectly hurtful by not leaving sufficient time for other and more serviceable employments of mind and body, by which the former may be strengthened against the vicissitudes of fortune and the moral crosses to which female life is doomed, nor healthful physical exercise, by which the material fabric may be fortified against the many causes of disease continually assailing it. The consequence of all this is that the young girl too often returns from school to her home an hysterical, wayward, capricious girl, imbecile in mind, habits, and pursuits, prone to hysteric paroxysms upon any excessive mental excitement. This, I may add, appears very liable to be superinduced by the pernicious novels of the erotic and sensational school which are the popular literature of young females, and by which the impressionable mind of girlhood is perverted, the passions stimulated, and the foundations laid for the future development of various morbid conditions of mind and body, and more especially erotomania and nymphomania.

"I shall only repeat that it may be regarded as an exaggeration of the peculiar sentimentality which is generally inherent in female youth, and which is usually so evanescent as to require little if any medical attention. In some instances, however, this excess of natural sentiment is of graver consequences, the mind becoming so occupied by its predominant illusion as to impair, more or less completely and permanently, the exercise of the rational faculties, and not alone produce mental derangement, but also react injuriously on the general health and more especially on the utero-ovarian functions of the love-sick girl. Instances of this kind are familiar to nearly all practitioners. There are few among us who have not been consulted by some anxious mother, alarmed at symptoms of mental dejection and nervous or mental functional disturbances, for which no physical cause can be discovered, arising from cardiac causes beyond stethoscopic diagnosis. This condition is, in its inception, entirely distinct from erotomania, but if allowed to develop unchecked may in some instances ultimately result in the latter."

The influence of dress is great on the physical health of young girls. All that has been written upon this subject by various writers has apparently been *nil*. The two important points to be here borne in mind with reference to female clothing, are, first, that the material should be such as may serve to retain the necessary animal warmth; and, secondly, that its form should be so arranged as to occasion neither undue visceral compression, nor any interference with muscular action. Hence, whatever little influence we may exercise in the matter in the way of advice is at this epoch to adopt the use of flannel or merino underclothing, all-woolen fabric, discard compressing corsets for corset waists with shoulder straps, beware of high-heeled boots and

tightly-fitting corsets, by which young ladies seek to reduce their natural proportions, however robust, and at whatever cost of comfort or health, within the prescribed limits of "the pink of fashion and the mould of form." This advice we should give when the occasion offers, but the good advice of physicians is seldom followed, for in such matters fashion and the modiste will probably continue to the end of the chapter reigning triumphant over common sense and the doctor.

The injurious consequences of the absurd modes prevalent in the dress of young girls are exemplified in the effects of tight lacing on the pulmonary functions, for the normal accomplishment of which free expansion of the chest and unimpeded action of all the muscles connected with respiration are so essential. The results of errors of this kind are most apparent at the period of puberty, when the young lady exchanges the comparatively easy garb of girlhood for that imposed by the requirements of fashionable life. And these errors reach their extreme in the attire of the ballroom or theater, or what "on the *lucus a non lucendo* principle is now regarded as full dress." "At these assemblies," Dr. Barlow has well observed, "the tightly-laced stays, the exposed chest, and thin draperies furnish a combination of influences the combined effects of which no constitution could withstand; while to these is yet to be added that of respiring for hours in a heated and vitiated atmosphere, and after this, of passing, when relaxed and exhausted, into the cold current of a frosty night air. So, far from wondering that many suffer from these imprudences, our surprise should be that any escape; and instead of the inherent delicacy so often imputed to the constitution of females as explanatory of their peculiar ailments, we have ample proof, in their power of resisting such noxious influences, that they possess conservative energies not inferior to those of the most robust men. Were men to be so laced, so imperfectly exercised, so inadequately clothed, so suffocated, so exposed, their superiority of bodily vigor would soon cease to have any existence.

"Defect of clothing, though most signal in the chest and shoulders, is not confined to the upper part of the body. The feet require warmth, which subservience to fashion prevents; they can not be compressed, but at the cost of much suffering, some distortion, and the infliction of positive disease. Fashion also permits the legs to be covered with only the thinnest material. Thus the capillary circulation of the feet, rendered sufficiently languid by the general weakness, becomes further impeded by the pressure of tight shoes and the debilitating effects of cold. The crippled state, too, thus occasioned is a further obstacle to efficient exercise, and so adds to the general debility."

General Treatment of Nervous Disorders of Female Puberty.—We will notice the most important points in the treatment which appears to me to be the most applicable to the management of the ordinary forms or phases of hysterical disease at this period.

First of all, the treatment should begin from birth. All hysterical mothers (some fathers, too, for that matter) should begin

from early life to train the child, not allowing any irritation to exist about the genitals; give the child light, nutritious diet at night; put it to bed early; never whip a child at night, or even scold one severely, as it will almost invariably cause disturbed sleep, which is calculated to help or develop hysteria in a child who has a hereditary tendency. Greet your child with a merry good-morning; give him a wholesome breakfast of milk with the *cream* on it, a raw egg or a very soft-boiled egg, or well-cooked oatmeal mush, or a warm roll with fresh butter, not stale or packed butter, as it is poorly assimilated, and is unfit for children; no coffee nor tea; if they ask for either, give a cup of hot milk with a little tea or coffee in the milk. In cities some children will make a meal of toast for their breakfast, and go to school and work till noon with nothing else; in children thus fed you may expect a nervous breakdown, especially those who have a weak constitution. Provide pleasant and healthy exercise for your children. Parents should enter into the amusements of their children, taking at all times an interest in answering questions propounded by the children. They are developing; their minds are unfolding; and they are wondering what is the meaning of what they see and hear. They should be carefully taught by their own parents; and if mothers will study the peculiarities of each one of their children, and train each according to his or her disposition (no two in a family are alike), they can thus aid nature in developing their daughters out of hysterical tendencies by the time they arrive at the age of puberty.

Boys should also have equal consideration in all these particulars, in order that they may grow up to be strong, vigorous men.

The curative effects of change of climate and the utility of chalybeate and other mineral and thermal waters, though obvious in all chronic diseases, are in none so essential as in the nervous and hysterical disorders of puberty. In such cases by a trip to the country, and, where the parents can afford it, a journey to a foreign and distant health resort, the patient is given the benefit of change of climate, occupation, and mode of living. The new scenes and places, with variety of climate, suggest new thoughts, by which the attention of the hysterical girl is diverted from morbid fancies and exaggerated sensations, until at length, by ceasing to dwell on her self-created complaints, they gradually cease to trouble her.

Foremost among the remedies by which we may hope to allay the perverted molecular activity of the nerve centers in the hysterical disorders of puberty, is the galvanic and faradic currents of electricity properly applied by an experienced physician or specialist. This, in the writer's opinion, will do more toward tiding the hysterical patient over that epoch than all the other therapeutical remedies combined. However, such treatment is often unavailable, hence we have to have recourse to medicinal agencies. The various special nerve sedatives are different bromides and the valerianates of quinine and zinc. Mere hypnotics are of little value, and narcotics, more particularly opium

and its alkaloids, are worse than useless for this purpose. We must seek to remove any local disease or to restore any disordered function of which the hysterical disturbance may be the result; but in doing this we should be careful to avoid the imminent possibility of increasing whatever vaginal, uterine, or ovarian hyperæsthesia may be present by any topical examination and treatment that is not absolutely necessary. We must insist on healthy occupation of the mind and body, and fit the latter for this by the appropriate remedies called for by the special requirements of each case. If the nervous derangement is consequent on disordered menstruation, this condition must, if possible, be rectified. If it results from premature or undue stimulation of the sexual organs, the physician should point out distinctly the physical and moral evils consequent on such abuses.

In conclusion, it only remains for me to add that in the foregoing attempt to describe the many-sided medical aspects of the epoch of puberty, and quoting freely from eminent authors upon this subject, I am actuated by the hope that this may be the means of helping all mothers in their noble and godlike work to bring up their children to full maturity, strong, healthy, and vigorous.

CHAPTER XXV.

FEVERS AND MIASMATIC DISEASES.

Definition and Nature.—The term "fevers" is used in its widest sense, denoting a complexity of symptoms, or group of symptoms, of which heightened temperature is the most striking and the most constant.

Disorder, then, of the body heat, in the direction of increase, is the essential condition of fever. We quote from William Pasteur: "In health the maintenance of a normal temperature involves three cooperant factors,—a source of heat, channels for the discharge of heat, and regular mechanism which shall maintain a stable balance between heat production and heat loss. Owing to the integrity of this mechanism, any variations in heat production are immediately compensated by concurrent variations in heat discharge, so that the temperature of the body as a whole is not appreciably affected. It has been shown experimentally that during fever the variations of the two processes are no longer interdependent,—that the regulating mechanism is out of gear. In consequence of this the rates of heat production and heat loss vary irregularly, so that the elevation of temperature can not be regarded as a true measure, either of increase of the former or of diminution of the latter. Under circumstances determining a diminution of heat loss, a high temperature may coexist with a low rate of heat production; and, conversely, if heat is being rapidly parted with, there may be a considerable increase of heat production without any commensurate elevation of temperature. So that we must conclude that while the clinical thermometer affords unmistakable evidence of some derangement of the heat-maintaining apparatus, it throws little or no light on the nature or direction of the disturbance. In fever, as in health, the source of heat is the same, at least in kind."

It is stated with admirable clearness by Professor Forester: "We may at once affirm that the heat of the body is generated by the oxidization, not of any particular substance, but of the tissues at large. Wherever metabolism or protoplasm is going on, heat is being set free. . . . In growth and in repair, in the disposition of new material, in the transformation of lifeless pabulum into living tissue, in the constructive metabolism of the body, heat may be undoubtedly to a certain extent absorbed and rendered latent; the energy of the construction may be in part, at least, supplied by the heat present.

"But all this, and more than this,—namely, the heat present in a pontential form in the substances so built up into the tissue,—is lost

to the tissues during its destructive metabolism; so that the whole metabolism, the whole cycle of changes from the lifeless pabulum through the living tissue back to the lifeless product of vital action, is eminently a source of heat." "Thus it is in increased destructive metabolism that we must look for the origin of fever-heat, and its chief seat is the muscles. In health it is estimated that they yield four-fifths of the whole body heat, and in fever their relative contribution is probably larger. Both clinical and pathological observations bear witness to the profound manner in which they are affected. Among these may be mentioned the characteristic pains and weakness, the marked wasting often so striking in the fevers of children, and the associated increase of the salts of potash, of urea, and of other nitrogenous substances in the urine."

The channels for the dissipation of heat are the skin, by radiation, conduction, and evaporation; and the lungs, by evaporation and warming of the expired air. As sweating is not so common in the fevers of children, evaporation necessarily plays a less-important role than in the fevers of adults. The pungency of the skin, which is often met with, may be partly due to this peculiarity. It is usually associated with a preternaturally dry skin and contracted cutaneous vessels, conditions which tend to prevent a rapid loss of heat, and therefore favor elevation of the surface temperature. We are all familiar with the remarkable way in which the aspect and feeling of the skin may vary during an attack of simple fever. In less than an hour a pale, dry, pungent skin may become flushed and moist. A febrile blush so intense as to arouse suspicion of an acute exanthema may vanish altogether in a few minutes. We see by these facts that heat discharge is largely under control of the nervous system, acting through the vasomotor nerves; but they also point with equal emphasis to the profound disturbance of that control. It is found that radiation increases steadily as the temperature falls, until a certain limit is reached; that it varies directly with the activity of the process of nutrition and metabolism, and is therefore more active in children than in adults; and it is said further, there is some ground for believing that it is subject to nervous control. These conditions call for light covering and cool, well-ventilated sick-rooms.

Causes of Fever.—It is almost impossible to formulate a classification of the causes of fever, which shall be at once simple and comprehensive. Experimental investigation on ferments and putrid intoxicants have thrown much light on the nature of inflammatory fever. But the nature of the relationship of many of the acute specific febrile diseases to the invasion and multiplication within the body of pathogenic micro-organisms still remains to be solved. In common with ferments and putrid intoxicants, the poisons of the majority of these diseases exert a pyrogenic effect after being received into the circulation. Their precise mode of action is still a matter for speculation.

It may be possible that all pyrogenic substances act by producing a common change in the body.

The first group of fever-producing agents comprises substances which, if not actually identical with physiological ferments, are readily produced by them independently of the action of bacteria. Some of them are normally present in small amount in the body; others may be produced in the disintegration of extravasated blood or by the abnormal disintegration of tissue, and if absorbed in sufficient quantity or under suitable conditions, are held to be the cause of the febrile state known as ferment intoxications. As probably members of this group, may be cited cases called aseptic fever, following extensive injuries or lacerations in spite of rigorous antiseptic precautions, and the febrile reaction attending subcutaneous injuries and extravasations, especially fractures of large bones. It is probable that the pyrexia which accompanies certain forms of anæmia, and possibly some obscure varieties of simple fever, also belong to this category.

The second group comprises substances which are the product of micro-organisms not in themselves pathogenic, that is, not capable of further multiplications when inoculated in pure cultivation into the body. Their presence in foul wounds leads to the formation of chemical substances, which, when absorbed into the circulation, give rise to pyrexia with toxic symptoms,—putrid intoxication. Under this head are included the febrile state, which subsides after the thorough cleansing of a foul wound, and the whole class of septic fevers, which result from absorption of poisonous substances produced in necrotic or disintegrating tissues or exudations, or extravasated blood, by the action of purely saprophytic bacteria. Of this nature are probably also the secondary fever of variola, and, in part at least, the fever of typhoid after the end of the second week.

Fermentative and putrefactive bacteria are normally present in the alimentary canal, and it is probable that under certain circumstances the products of their activity may, by their absorption, give rise to febrile attacks, which are, however, for the most part, of a milder type than those just mentioned.

Of far graver significance are the putrid intoxications which result from ingestion of substances which, outside the body, have undergone putrefaction, or changes which lead to the formation of ptomaines. Some of them appear to be harmless, but the introduction of others into the circulation is attended with pyrexia with toxic symptoms. They may be absent in advanced decomposition, and in general the most virulent ptomaines are formed in the earliest stages of putrefaction. There are also differences in the kind of bacteria present, according to the nature of the substances decomposed, and to various other circumstances, such as the presence of oxygen, the temperature, etc. Of this nature are some of the cases of poisoning which have been caused by eating unsound meat, fish, cheese, etc. The absorption of poisons of a similar kind, not necessarily the product of pathogenic

bacteria, such as is met with in cases of diphtheria and hospital sore throat, produce the constitutional disturbance which is not uncommon in scarlet fever toward the end of the third week, in association with the onset of nephritis.

In the third group are included the poisons of the acute specific febrile diseases. Of them we know that they are specific, *i. e.,* that the disease which they produce, and of which pyrexia is a constant concomitant, never pass the one into the other; that they prevail epidemically or endemically; that they are in large proportion infectious or contagious; that they may gain admission to the body by various routes, some by inoculation, some by the respiratory mucous membrane, some by the gastro-intestinal tract. The nature of many of these poisons is said to be still uncertain.

Significance of Heightened Temperature in Children.—The temperature of children in health is characterized by a relative instability which renders it liable to disturbance by a variety of causes, many of them of the most trivial nature. This is to be accounted for partly by the undeveloped state of the nervous system, partly by its state of active growth. Almost a mere nothing will send an infant into a high fever; a very little restores it again to health. But as the child grows, its temperature becomes less liable to disturbance, until with years it gradually acquires the stability which distinguishes the temperature of adults.

The readiness with which physiological tissue activity in a child gives place to a pathological activity in the presence of disturbing causes, is also a reason why fever is a frequent concomitant of disease in children. As examples of their tendency may be mentioned acute lymphadenitis, that common cause of fever, and the proneness of inflammation to issue in suppuration. In the same way instability is the key-note to the peculiarities of febrile temperature of children. It contrasts with the pyrexia of adults, less on account of any difference in range and height than because of its striking tendency to present sudden and temporary remissions. It may rise and fall several times in twenty-four hours. Periods of high and low temperature may alternate in the most uneven and irregular manner. A trivial cause may send the temperature to 104 degrees Fahrenheit, or even higher, without apparent discomfort to the patient, whereas a fatal case of pneumonia may run its course without the temperature exceeding 102 degrees Fahrenheit.

In young children and infants it is best to take the temperature in the rectum or in the groin. In older children it may be taken in the mouth, or axilla. The rectal temperature is about 70 degrees Fahrenheit higher than in the axilla, and 50 degrees Fahrenheit higher than that in the mouth.

The following criteria have been laid down on the significance of pyrexia in children: "The pyrexia is good which is lower in the morning than in the evening; which is equal or with but slight variations

during the day; which has a single rise and a single fall in the twenty-four hours; and whose lowest morning level approaches the normal line. The pyrexia is bad which is highest in the morning; which ascends from evening through all hours; which has two or more rises or falls for one day and night; which either maintains its level above 103 degrees Fahrenheit pretty equally for many hours together, or else is very variable from day to day and conformable to no pattern. The temperature register gives the first warning of impending mischief after injuries and surgical operations; it supplies our sole means of watching and of measuring hyperpyrexia; and in conjunction with other signs (by no means by itself) it helps to distinguish certain fevers, and to estimate their progress and severity. These latter, however, are but occasional uses." (Sturges.)

Stages and Types of Pyrexia.—Three stages are generally recognized: the initial stage, that of rising temperature; the elevation, or stage of sustained high temperature; and defervescence, during which the temperature returns to the normal level. The duration and pattern of each stage vary considerably in different diseases, and in the same disease according to circumstances. A rapid and continuous rise is the rule in scarlet fever and ague, while in measles and typhoid fever the rise is more gradual and often broken by a series of remissions. Crisis is the more common mode of defervescence. The actual crisis may be preceded by one or more sharp and deep remissions; this is sometimes the case in acute pneumonia. Typhoid fever affords a good example of defervescence by lysis. After defervescence, the temperature is often subnormal for a few days; and during convalescence it is characterized by its greater instability, and liability to disturbance by causes which would make little or no impression on the temperature of a healthy child.

In the terms continued, remittent, and intermittent, which are still in common use, we have a survival of the nomenclature of an age in which fever was regarded as a disease—a morbid entity—presenting different types. At the present time these terms are used to qualify the pattern of a pyrexia, rather than as a basis of classification. They are too well known to need special description. The remittent type is especially common in the fevers of children. Hectic fever is the name given to the remittent or intermittent fever which occurs in some wasting diseases, more especially when these are accompanied by chronic suppuration with profuse discharge of pus. It is often present in pulmonary and abdominal tuberculosis with or without ulceration. In the early stages there may be intermissions during the day, with febrile disturbances toward evening. As the disease progresses, the fever assumes a remittent type, with exacerbations at night and perhaps in the morning. The rise and fall of temperature may be preceded by chilliness and end in a profuse sweat, especially about the head and shoulders.

Symptoms of Fever.—Prodromal symptoms may be present, but

are often absent or pass unnoticed. They are peevishness or apathy, distaste for food, languor, and sometimes headache in older children. The onset is often quite sudden.

In the initial stages, rigor is very rare, even in septicæmia, acute necrosis, and ague. It is generally absent in the eruptive fevers and pneumonia; older children complain of chilliness. Dusky pallor of the face and lips, and cold extremities and burning heat of the body, are not uncommon at the outset of a sharp attack of fever. In discussing the cause of convulsions in children, Hughlings Jackson, M. D., makes the following reference to that now under consideration: "Convulsions, which may occur as an initial symptom, may occur in almost any acute febrile disease, but are, on the whole, more common in the eruptive fevers; it does not materially affect the ultimate prognosis." We must not lose sight of the fact that children are liable to convulsions under many different circumstances, such as rickets, a state of exhaustion, dentition, diarrhœa, and organic disease of the brain, besides the convulsive seizures termed essential. All these possible causes have to be reckoned with when we are called upon to pronounce an opinion on a case of convulsion. If the temperature is high during the convulsion, and continues to rise as the seizure passes off, we may suspect the outset of some acute fever. An inquiry into the family or personal history will often thrown light on the cause. A clue may be found in examining the chest. Albuminuria immediately following a convulsion is of some diagnostic value at the outset of a fever; it may be due to the direct effects of the convulsions. The question may arise whether a convulsion indicates the outset of acute cerebral disease, especially tubercular meningitis. This is only likely to occur where convulsion is the first symptom for which we are consulted. Tubercular meningitis is a disease of gradual and insidious outset, and very rarely begins with convulsions. The *status epilepticus* must be carefully distinguished from tubercular meningitis. In this condition, which results from a quick succession of fits, the temperature sometimes attains a considerable height, 106 degrees Fahrenheit, and the urine may be albuminous. Of far more serious import are convulsions occurring during the eruptive stage of scarlet fever, measles, and variola. In the later stages of fever, when the patient is much exhausted, there is again manifested a tendency to convulsions, which occasionally usher in the fatal event. Vomiting is a very frequent early symptom. It may take place after a meal or without relation to the ingestion of food; when severe and repeated, it is apt to induce collapse. The association of repeated vomiting with headache and drowsiness will raise suspicion of meningeal trouble. This grouping of symptoms, however, is sometimes seen in simple continued fever, and has been known to precede the crisis of acute pneumonia. The skin is usually dry and hot at times, especially in tubercular disease. Sweating is decidedly rarer in children than in adults; the perspiration of acute rheumatism is often limited to the palms and soles, that

of rickets to the head. Pyæmia may run its course without a sweat. Except at the crisis of a fever, the occurrence of profuse sweat is an unfavorable symptom. Sweats are apt to occur in chronic tubercular disease with suppuration, and in the later stages of tubercular affections of the chest and abdomen. As a rule, however, phthisical patients do not sweat in excess. Occasionally there is an eruption of sudamina on the chest, which may lead to a branny desquamation. In these cases bed-sores seldom occur.

The aspect of the skin is very variable. Some children are pale at the onset of fever; others look hot and flushed. The two conditions may alternate in the same patient. When the skin is usually flushed, the condition is sometimes designated as the "febrile blush." In some cases it presents a close, though superficial, resemblance to the rash of scarlet fever, and has more than once led to a mistaken diagnosis, even at the hands of competent observers. Cases are reported as being admitted each year into fever hospitals as scarlatina, which ultimately prove to be cases of simple continued fever, or they have developed into typhoid. The febrile blush is generally an early phenomenon. Its duration is very variable, lasting in some cases but an hour or two; in others it persists, with varying intensity, for several days. Sometimes it is followed by branny desquamation. A high temperature is by no means necessary to its occurrence. The febrile blush is usually well developed on the face, neck, and upper part of the chest. It also affects the dependent parts of the body, the back, the buttocks, and backs of the arms and legs. It is usually faint on the lower abdomen and inner aspect of the thighs. When fully developed, it consists of a bright reddish-pink blush, uniformly diffused beneath the surface, and fading momentarily on pressure. It is very evanescent, and apt to shift from place to place. Exposure of the chest often causes it to disappear entirely in a few minutes, to return again as soon as the clothing is replaced. In some cases it occurs in large, irregular patches with ill-defined borders. The distinction from the rash of scarlet fever is not likely to offer any difficulties, except in cases where the blush is unusually intense and persistent. The chief points of difference are the following: On the face the febrile blush is often well marked, and reaches to the margin of the lips; the rash of scarlet fever is generally faint on the face, and leaves untouched a zone of skin around the mouth. The blush of fever is usually faint or absent in the groin and on the inner aspect of the thighs, parts where the scarlatina eruption is generally well marked. The blush lies beneath the surface of a perfectly smooth skin; the rash of scarlet fever is punctiform, and not necessarily uniformly diffused. The blush is less persistent than the rash, and more susceptible to external influences.

Labial herpes is seen in many kinds of fever, but is not necessarily an early sign. It is relatively common in pneumonia, not rare in acute tonsillitis, febrile-gastric disorders, and febricula, and may occur in the eruptive fevers. Its presence practically excludes the

diagnosis of typhoid fever. The lips dry quickly and become cracked. Children are apt to pick and cause them to bleed, and sometimes to become swollen. This picking at the lips or at other parts of the body is often a sign of nervous prostration.

The tongue does not present with any constancy, or in the same degree, the varieties of aspect which characterize it in certain febrile diseases of adults, and is therefore of little value in helping the diagnosis. An exception may be made in favor of scarlet fever. Slight furring on the dorsum with redness of the tip and edges is the rule, but the tongue may remain clean and dry throughout. A dry tongue may become brown, but it rarely cracks to any great extent, even in typhoid fever. The thick creamy fur of rheumatic fever is hardly ever seen. Some injection of the fauces is common at the onset of an acute fever. The appearance presented differs in degree only from a mild scarlatinal throat.

The digestive functions are almost invariably impaired. The salivary and pancreatic secretions are much diminished, giving rise to dryness of mouth, great thirst, distaste for food, and great difficulty in assimilating starchy food. The secretion of bile is probably also lessened; the stools are often pale and offensive. There is usually constipation, but this is a rule to which there are many exceptions. Diarrhea is rare at the onset of fever, but may accompany the crisis.

The pulse of children in fever does not exhibit any marked peculiarities. In infants undue pulsation of the fontanels will suggest excited vascular action. The frequency of the pulse is always increased. It is often full and bounding in the earlier stages, but tends to become smaller and weaker as exhaustion increases, and in the later stages, when death is threatening, is often running or thready, and impossible to count.

Increase in the frequency of the respiratory act is a constant and important concomitant of fever. The respirations may rise to forty per minute, and the alænasi be set in action, even in the absence of any pulmonary complication. Rhonchi and scattered rales may also be heard over the lung during the exacerbations of a simple catarrhal fever, which disappear entirely when the temperature remits. This accession of pulmonary signs is occasionally very well marked during the hot stage of ague, and may render the diagnosis from pneumonia or broncho-pneumonia somewhat difficult. It is to be remembered, however, that while catarrhal fevers may be accompanied by very definite pulmonary signs, the simple bronchitis of children is often attended by high temperature, even though no pneumonia is present. The disturbances of the sensorium vary greatly in different cases. The reason of this is to be sought partly in the individual differences of temperament and resisting powers, partly in the nature and degree of the intoxication. Many a case of simple fever runs its course without causing any appreciable impairment of health. In others cerebral symptoms, vomiting, drowsiness, headache, etc., predominate to such

an extent as to justify the recognition of a cerebral type of simple fever. Profound and rapid prostration, with or without coma or convulsions, is often seen in the malignant forms of the fever-poisoning of the nervous system. Restlessness, irritability, and drowsiness are common symptoms. Uneasy sleep and sleeplessness are also of frequent occurrence; and although in themselves insignificant symptoms, they demand close attention and proper treatment. A few hours of peaceful sleep will do more than anything else to restore the strength of a child ill with fever. Children under five do not generally complain of headache. Altogether, this symptom is far less common than in adults. It is not rare, however, in the early stages of typhoid fever, and may occur in simple continued fever. The occasional occurrence of nausea during the course of a fever has no special significance. Severe and repeated vomiting, on the other hand, is a grave symptom, requiring prompt treatment, and liable to do much harm by increasing prostration. Delirium is relatively uncommon in children, and the key-note to this peculiarity probably lies in the incomplete state of their mental evolution. Talking during sleep, however, is common enough, and a tendency to ramble in their talk, when awake, is not rare. If prostration is very great, stupor, subsultus tendimum, tendency to convulsion, and picking of the body or the bedclothes are all unfavorable symptoms.

Hyperpyrexia is rare, except as the immediate precursor of death, when it may be regarded as one of the earliest stages in the process of dying. This form is not amenable to treatment. Rheumatic hyperpyrexia is said to be very rare.

The changes in the urine do not call for any lengthy notice. The total quantity is reduced and the specific gravity raised. On cooling, the urine generally deposits a sediment of white or yellowish-white lithates. This amorphous precipitate of mixed urates dissolves readily on heating. During convalescence it is common to find a cloud of white phosphates precipitated by heat, which dissolve at once on the addition of a drop of acetic acid. At this period the urine may also contain uric acid and oxalate of lime crystals.

The occurrence of temporary albuminaris is by no means rare. The quantity of albumen present is always small, rarely exceeding a large trace, and disappears rapidly with convalescence. The effect of fever on the body is generally well marked in children. Wasting is general, muscles and cellular tissues chiefly, but probably all tissues in varying degree. Emaciation often takes place with startling rapidity. A fever of twenty-four hours' duration may make a noticeable change, especially in plump, fat children.

Treatment.—In dealing with fever two lines of treatment are open to us. The first is to remove or destroy the fever poison. The other—our only resource in cases where the poison is out of reach—is to place our patient under the most favorable conditions, and treat injurious symptoms and complications as they arise. The child should

be placed in an airy, well-ventilated room with an equable temperature, between 60 degrees and 65 degrees Fahrenheit. The clothing and bed-covering should be light but adequate, our object being to allow radiation and evaporation free play without exposing the patient to the variations of the external temperature, which are apt to produce slight shivers. Linen clothing is to be preferred to flannel during the active stages of fever, except when there is much sweating. It is more pleasant to wear, is not so apt to irritate the skin, and can be more easily and effectually cleaned. Where linen is not used in families, muslin may be used. During convalescence, a flannel vest may be worn with advantage. Soiled body and bed linen should always be immediately changed and removed from a sick-room.

The diet should be bland and mostly liquid, and the food is best given in small quantities at short intervals. During fever the processes of digestion are always much impaired, and we should be careful to avoid overloading the stomach in our anxiety to sustain the strength of the patient. Milk is to be given as a food, and not as a drink. Cold water in plenty, or barley water flavored with lemon, may be taken to quench thirst. If pure milk is not easily digested it may be diluted with plain barley water or with a solution of gelatine or gum acacia. Beef tea and mutton broth are generally well borne, and should always form part of the diet of children over eighteen months old. If they should disagree, chicken broth or veal tea will be available. If the stomach becomes intolerant, pancreatized milk or beef tea may be tried by the mouth, or, if this should fail, may be given by the rectum in the form of nutrient enemas.

Constipation should be relieved, preferably by means of enemas (soap and warm water, or glycerine and water).

Diuretics and diaphoretic salines may be given, with plenty of water. They tend to promote free action of the skin and kidneys, and facilitate the removal from the tissues of waste products of fever.

Fevers due to some disorder of digestion generally yield at once to a purge or an emetic; and as many of the simple fevers of children are of this nature, castor-oil and calomel have acquired great repute in their treatment. The pyrexia which accompanies certain specific diseases will often yield to drugs which exert a specific action on the disease. As examples may be mentioned quinine and salicylates in the treatment of malaria and acute rheumatism. Fevers depending on purely local causes, in accessible situations, are also readily amenable to suitable treatment. Such are the putrid fevers of foul wounds, of acute abscesses, ulcerative stomatitis, and others. These classes of fever represent but a small fraction of the whole number, and do not include those which are most often dangerous to life.

When the cause of fever is beyond our reach, we must treat symptoms. Of these, pyrexia is notably one of the most important, and also the one that we are best able to cope with. It is well to bear in mind, however, that children are in general very susceptible to the

action of antipyretics, and that unless due care is exercised in the selection of suitable cases and appropriate methods, this form of treatment will often disappoint expectations. The occurrence of collapse constitutes one of the chief risks in the employment of antipyretics. To guard against this danger, they should always be used tentatively at the outset, and their effect carefully watched. Thus, after a bath or a dose of antifebrin, the temperature should be taken at least twice within an hour, in the mouth or in the rectum, according to the age of the patient. Any symptoms of collapse should at once be met by the exhibition of stimulants and warm applications to its surface. When cold applications cause much distress to the patient, they are of doubtful benefit, and should be discontinued, unless the reduction of the temperature is imperative, as in hyperpyrexia. In certain states external application of cold is contraindicated. In such a case cold is likely to aggravate the cyanosis and further depress the patient, whereas a warm bath and a little alcohol will often quickly improve the general condition. In some cases of cerebral disease where the employment of ice-bags or cold-water coils to the head has been a source of discomfort and irritation, much benefit has attended the substitution of hot fomentations.

Although it is said by the best authorities to be impossible to lay down hard and fast rules for their use, antipyretics may legitimately be employed, (1) in cases of sustained high temperature above 105 degrees Fahrenheit; (2) in all cases of hyperpyrexia; and (3) whenever the rise of temperature is accompanied by aggravation of the other symptoms, such as restlessness, want of sleep, drowsiness, delirium, or rapidity and weakness of cardiac action. These indications are more than ever imperative when the patient's strength has already been taxed by prolonged fever, and in children of weak physique. The means at our disposal are, (1) drugs, and (2) external application of cold.

The drugs on which most reliance can be placed (as agreed upon by all authors) are quinine in full doses, salicylates, and the class of antipyretics now in vogue, viz., antipyrine, antifebrine, and phenacetine. The last-named drugs must be given with due caution. In full doses they may depress the heart to an alarming degree; and this constitutes a serious objection to their use when there is much prostration.

Antipyrine has been extensively used, and its mode of action "increases skin radiation, lessens heat production, diminishes nitrogenous waste by checking destructive metabolism, and frequently, but not always, increases perspiration, while it generally slows the heart and slightly increases the tension of the radial pulse. It may fairly claim, therefore, to be a true antipyretic, and not merely a refrigerant." It has met with marked success in the treatment of fever. Its effect on the temperature is, unfortunately, very transitory, so that it may be necessary to repeat the dose every hour and a half to keep the pyrexia

under control. At times it causes gastric irritation and troublesome vomiting and occasionally diarrhea. This tendency may be obviated to some extent by adding one or two drops of tincture of opium; and it is a good plan to give a little whisky at the time to prevent depression. The administration of antipyrine is sometimes followed by an eruption of a measle-like appearance, a papular erythema, which appears first on the arms and dependent parts, and may spread to the remainder of the body. This rash is of no serious import, and quickly disappears on discontinuing the drug.

Antifebrine (acetanilid) possesses several advantages over antipyrine, and is gradually superseding it in the treatment of fever. Its mode of action is probably the same. As an antipyretic it is more rapid and powerful in its action, and its effect on the temperature is rather more permanent. Serious collapse is liable to occur when it is given incautiously, and it may cause rigors. It does not produce rash, and rarely creates nausea. It should be given tentatively at first, one-fourth to one-half grain to a child two years old, and the dose may be gradually increased to one and one-half grains for a child five years old. The dose required will vary according to the stage and nature of the fever. Full doses are generally needed in the early stages of the fever, specially in scarlet fever, in which the drug has proved of considerable value. The pyrexia of typhoid fever, as a rule, yields readily to all antipyretics.

Phenacetine, so far as we know, acts in the same manner as antifebrine, and is said to possess the same advantage.

Aconite is an old-time remedy, and is of conspicuous value in catarrhal fever the result of chill, and in acute tonsillitis. If given in the earliest stages, the general malaise, sense of chilliness or burning heat, pains, etc., rapidly disappear, and give place to a feeling of comfort. The author prefers small doses of aconite, from one-fourth to one-drop doses for children ranging from six months old to five years of age; it may be given, according to age, every half hour to every hour in cases of catarrhal fever or malarial fever. The skin soon becomes moist, and may sweat profusely, and the pulse is lowered in frequency. Much care is required in its administration. Owing to its powerful depressent action on the heart, its use must be discontinued when the fever has abated. Quinine must be given every three hours in small doses (two grains) in all cases of malaria, till there is no more fever. In all cases of fever, at the onset small doses of calomel, with one-half grain of soda for a child from six months old up to puberty, one-tenth of a grain to the infant six months of age, may be given every hour till three or four doses have been administered; and in about eight hours after the last dose has been administered, one may give a dose of the syrup of rhubarb (if castor-oil can be taken without too much nausea, it is preferable) to move off the calomel. Older children may take one-fourth of a grain of calomel with a grain of soda and a little sugar given every hour until three doses have been given; then follow, as

above advised, with a laxative. Keep up the use of quinine, as prescribed, until the child misses the daily paroxysm of fever. After the fever has broken, a tonic of iron, quinine, and a little strychnæ (Wyeth's Elixir) may be given according to age for two or three weeks.

The action of cold is not exactly known; it is highly probable that its good effects are attributable to some stimulant action on the system, as well as to the abstraction of heat from the surface and the probable diminution of heat production. It is certain that this mode of treatment is far more effective in rousing the depressed sensorium and combating prostration than the antipyretic drugs. As a rule it induces a refreshing sleep, whereas this desirable result only occasionally follows the administration of antipyrine and its allied remedies. This mode of treatment is always to be preferred when there is much prostration. In a general way children do not stand cold very well, and tepid applications should always be given a child first, before using cold.

Sponging.—The face, trunk, and limbs are sponged over for ten or fifteen minutes with tepid water (80 degrees Fahrenheit) or with cold water (50 degrees Fahrenheit or lower). The surface is then rapidly dried and the covering replaced. A sheet and a single blanket will generally suffice. If tepid water does not bring about the desired effect, a graduated bath is likely to answer better than sponging with cold water.

Compress.—This consists in the application to the body or limbs of cloths wrung out of cold or ice-water, according to the temperature. If the temperature is 103 degrees to 105 degrees Fahrenheit, cold water or ice-water may be used. The cloths require to be very frequently changed, and should be discontinued when the temperature has fallen below or to 100 degrees Fahrenheit. Like sponging, compresses demand constant attention on the part of the nurse, and may interfere with sleep. They are chiefly used in typhoid fever when there is much abdominal distention and it is not advisable to disturb the patient.

Bathing.—The bath is the most powerful antipyretic agent we possess, and almost the only one that has achieved success in the treatment of hyperpyrexia. (William Pasteur, M. D., F. R. C. P.) Its chief value in the treatment of children, however, is due to its combined stimulating and sedative effect on the nervous system. To allay restlessness and general malaise, a warm bath (95 degrees Fahrenheit) will often accomplish all that is needed, and is usually followed by some lowering of the temperature. The effect of a bath at 80 degrees Fahrenheit is more powerful and lasting, but less agreeable to the patient. When reduction of temperature is the primary object, a graduated bath is, on the whole, the most convenient plan. The child is placed in a bath at 90 degrees Fahrenheit, which rapidly lowers in temperature by the addition of cold or ice-water. The bath should be of short duration, and given in the presence of a medical attendant. The rectum temperature should be taken at intervals of a few minutes, and the child removed from the bath when it has reached 100 degrees Fahrenheit, as the fall of temperature may now be considerable. It is

often advisable to give small doses of whisky both before and after the bath. In ordinary cases the occurrence of shivering, or of a blueness of the lips and extremities, is an indication of immediate removal from the bath; and warmth must be applied over the heart and to the feet till the chilliness abates.

Cold Wet Pack.—The patient is wrapped in a sheet wrung out of cold or ice-water, and covered over with a thick blanket. The pack should not be continued longer than from ten to fifteen minutes.

The water-bed or water-pillow may be used to reduce the temperature by allowing water at a suitable temperature to circulate through it; but it is a convenient and satisfactory method of carrying out this object.

Ice-bags or ice-water coils are applied to the head for the purpose of allaying meningeal inflammation and reducing temperature. A piece of flannel should be laid between the ice-bag and the head, or wrapped around the ice-bag if only one thickness of flannel is needed.

In combating prostration and the exhaustion of prolonged fever, stimulants must be used, and are a most powerful means of supporting the vital powers till the exhaustion is overcome. Besides the general condition and aspect of the patient, the state of the tongue and that of the pulse afford the safest indications for their employment. When stimulants can not be given by the mouth, alcohol or ether may be administered by subcutaneous injection, or in the form of enema with a sufficiency of water or beef tea.

CHAPTER XXVI.

SIMPLE CONTINUED FEVER.

Definition.—This is a fever of short duration, which is not characterized by the presence of any definite local lesion, or preceded by any definite local lesion, or by any known invariable antecedent. It is, in truth, a morbid genus without essential attributes, and made up, in large part, of aberrant varieties of other species. An initial diagnosis of febricula has often to be set aside in favor of pneumonia, typhoid, tonsillitis, or some other acute febrile disease; and the converse happens with equal frequency. Such facts bear strong testimony to the indeterminate character of this affection. (Pasteur.)

Simple fevers are very common in childhood, and their early recognition is of great practical value. They may be roughly grouped under the following heads:—

1. Abortive or incomplete forms of the specific continued fevers, typhus, typhoid, and relapsing fever. Cases of irregular types may occur at any time, but are more frequent during the epidemic prevalence of these diseases.

2. Cases of scarlet fever, modified variola, and more rarely measles and erysipelas, in which the eruption is either absent or unnoticed.

3. In rare instances, anomalous forms of intermittent fever.

4. Fevers due to the effects of some localized inflammation, in which the local signs are transient, ill developed, or beyond the reach of observation. Cases of this kind occur in connection with lymphadenitis, tonsillitis, and acute catarrhal affections of the alimentary and respiratory mucous membranes.

5. The whole group of fevers caused by disorders of digestion, attended by the absorption of pyrogenic substances.

6. Fevers depending on some disturbance or exhaustion of the nervous system, as a consequence of exposure to heat or of some peripheral nerve irritation.

The only symptom, so it is said, common to the whole class is fever or pyrexia, and in a considerable number of the cases it constitutes the whole disease. The access is generally sudden, but may be gradual. The temperature often attains a considerable height, 104 degrees to 105 degrees Fahrenheit. The initial rise may be ushered in by any one of the symptoms considered in an earlier part of this article. Vomiting is common; convulsions, on the whole, are rare. Some or all of the clinical symptoms of fever, before described, may be present in varying degree. The febrile blush is often particularly well marked.

The pulse and respirations are always increased in frequency. Restlessness, wakefulness, and slight delirium are not infrequent. Constipation is the rule, with furred tongue and disinclination for food. Thirst is nearly always excessive. The urine is usually scanty, being thickly coated; vomiting frequent, thirst unquenchable, and the bowels difficult to move.

In others the respiratory organs bear the brunt of the attack; the breathing is quick and somewhat labored, the alænasi acting strongly, the face a little dusky, while numerous rales and rhonchi are audible all over the chest; meanwhile the tongue may remain almost clean, and digestion be but little impaired. A cerebral type has already been referred to, in which headache, repeated vomiting, intolerance of light, and irritability or tendency to delirium, are prominent symptoms.

The temperature generally falls by crisis at the end of two or three or five or six days, and convalescence is always rapid. The diagnosis rests chiefly on the exclusion of other acute fevers.

Typhoid fever, pneumonia, tonsillitis, scarlet fever, and meningitis are the diseases of which the diagnosis is most difficult in the early stages. The occurrence of sharp attacks of fever in a perfectly healthy child, is in favor of febricula. The prognosis is always favorable; in the way of treatment, rest in bed for a day or two, with liquid diet, is all that is said to be required in some cases. The writer would advise, at the onset of febrile diseases, such remedies as are necessary to act directly on the liver. Very small doses of calomel, with a saline, as Rochelle salts or citrate of magnesia, will always relieve the portal circulation; this, with plenty of liquid food, milk, eggs (soft-boiled), beef tea, etc., with quiet and hygienic surroundings, will probably be all that is necessary in some febrile cases. Cool drinks and diaphoretic salines are very useful throughout the entire stages of the fever. It must be borne in mind that what appears to be simple fever at the outset may prove to be some severe or highly infectious disease; and, further, it would seem that certain forms of febricula are infectious. It is common experience to find all the children in a household sicken one after another with a fever of short duration, accompanied, sometimes by bronchial catarrh, and at other times by marked gastric disturbance. A knowledge of these facts should be borne in mind, thus making us doubly cautious in dealing with cases of this nature.

CHAPTER XXVII.

THERMIC FEVER; HEAT STROKE; INSULATION.

Definition.—Acute fever produced by exposure to heat. Thermic fever is always dependent upon exposure to heat, natural or unnatural. Owing to interference with evaporation, a hot, moist atmosphere is much more dangerous than dry heat; hence sunstroke is rare in a dry climate, and frequent in tropical lowlands, as well as in sugar refineries, laundries, and similar places. It may occur in the night as well as in the day. Very powerful as predisposing causes are lack of acclimatization, excessive bodily fatigue, and intemperance. Males are more frequently affected than females, because of their more frequent exposure.

Symptoms.—The symptoms of sunstroke are a combined fever without local disease, with a tendency to weakness and the typhoid state, and various disturbances of function. In India, it is stated, the disease is apt to end in a sudden development of the severest type of thermic fever and death; in America the patients usually recover under treatment.

Sunstroke commonly begins with abrupt complete unconsciousness, although prodromes, such as general distress, a great burning heat, and chromopapsia, or colored vision, do occur. With the unconsciousness there is usually muttering delirium, great muscular restlessness, partial convulsions, or violent epileptiform attacks; sometimes there is quiet coma, with relaxation. The pulse may be bounding and full, but is almost invariably compressible, and if not originally rapid and feeble, becomes so as the case progresses; vomiting and purging are common.

The whole body is apt to exude a peculiar odor, which is especially strong in the fæcal discharges. The characteristic symptom is a temperature which is rarely below 108 degrees Fahrenheit, and may reach 113 degrees Fahrenheit; the urine is scanty, sometimes albuminous, not rarely suppressed. The breathing is more or less labored and irregular. The pupils are dilated. In most cases some response can be obtained by shaking the patient, except very late in the disorder. Death may occur in about half an hour, but usually is postponed for a longer period; it is ordinarily the result of a slow, simultaneous failure of respiration and of heart action, that may be due to asphyxia, or in very acute cases to cardiac arrest.

A condition similar to sunstroke may develop in so-called cerebral rheumatism and other affections with very high temperature. As was

first pointed out by Dr. Comegys, many of the cases of so-called cholera infantum occurring in young children in the large cities of America during the summer months, are really forms of thermic fever. The symptoms in such cases are high fever, intense thirst, rapid pulse, and respiration, vomiting, purging; there are more or less pronounced evidences of cerebral disturbance, such as insomnia, headache, contracted pupils, delirium, and finally coma, ending in death. (Fitz, M. D.)

Diagnosis.—The diagnosis is made the moment the temperature is found to be 108 degrees Fahrenheit, or upward, because such temperature produces a thermic fever whether the temperature is due to external heat or not. A knowledge of the exposure to heat and high temperature confirms the diagnosis.

Treatment.—Mild cases of thermic fever are most satisfactorily treated with cold or graduated baths. In severe cases with unequivocal hyperpyrexia, immediate treatment is of paramount importance. Cold affusion, cold baths, and rubbing the surface with ice, are the most powerful means at our command. The thermometer in the mouth or rectum is our only safe guide as to the effect of treatment. Great care must be used to avoid collapse. When exposure to high temperature can not be helped, it is essential that the bodily health be maintained, and that all excesses in labor or in pleasure be avoided. The diet should be largely farinaceous, and the emunctories should be kept active by eating fruit, and by the free use of cold water and of lemonade, and of mild salines if necessary. Ice-water, if taken in large quantities, may do harm by suddenly chilling the stomach, and drunk at meals may interfere with digestion; but drunk in moderate quantities at short intervals between meals, it does great good by reducing the general temperature and aiding free perspiration. All alcoholic drinks are to be avoided, except that a little claret or red wine may be added to the ice-water with advantage to make it more agreeable to the gastro-intestinal tract and more active in promoting perspiration. Cold baths should be used frequently, especially if at any time the bodily temperature be found to be rising. According to Guiteras, in subacute or continued thermic fever the best plan is to wrap the patient in a dry sheet, lift him into a tub of water at a temperature of 80 degrees Fahrenheit, and then rapidly cool the water with ice, the immersion continuing from forty-five to fifty-five minutes, according to the effect upon the mouth temperature.

The patient is then to be placed upon a blanket, the skin partially dried, and the body covered. Guiteras states that it is very important to avoid currents of air blowing upon the patient, and the bath must be given in a small, warm room; also that in most cases great advantage is to be obtained by giving moderate doses of whisky, with from twenty to thirty minims of tincture of digitalis about twenty minutes after the bath. Guiteras never found it necessary to give more than two baths in the twenty-four hours, but in some cases the baths had to be used for many days.

In acute thermic fever the bodily temperature is to be reduced at once by the means most convenient. There should be no waiting for the calling of a physician. The patient should be carried to the shade, and have cold affusions over the face and body, or should at once be put under a pump and be pumped on, or should be put into a bath of ice-water. In giving the cold bath a thermometer should be put in the mouth or rectum. Remove the patient from the bath when temperature reaches 101 degrees Fahrenheit, as it is not rare for the temperature to continue to fall after removal from the bath. Alcohol, and strychnine and digitalis, administered hypodermically, may be necessary even while the patient is in the bath, when the symptoms seem to point urgently to them; antipyrine is said to be a valuable remedy for the purpose of preventing rise of temperature after the patient has been taken out of the bath.

It is said that when there is a hard pulse in a case of sunstroke, and the symptoms are essentially those of a congestive apoplexy, free venesection is sometimes useful, as it is especially a powerful reducer of bodily temperature. When the convulsive tendency is very acute, morphine may be given hypodermically.

As soon as possible after sunstroke, the patient should be moved to a cool atmosphere, and should be kept upon a light, farinaceous diet, and generally treated as if in danger of an acute meningo-encephalitis. Especially if there is any tendency to headache or cerebral flushings, local blood-letting, followed by blisters and other forms of counter-irritation, should be used. If the headache is intense when the patient comes to himself, general venesection, it is said, may afford a means of relief.

SEQUELAE.

In adults, cerebral distress or pain, with failure of general vigor, dyspeptic symptoms, and various indications of disturbed innervation, frequently occur after thermic fever. In pronounced cases the pain in the head is more or less constant, but subject to exacerbations, and is sometimes associated with pain and stiffness in the back of the neck. With it there may be vertigo, decided failure of memory, and of the power of fixing the attention, insomnia, and excessive nervousness and irritability. When such is the case there is usually a marked lowering of the general health, with loss of strength, and the peculiar invalid look which characterizes some chronic diseases. The one symptom which is always present, and which is diagnostic in these cases, is the inability to withstand heat; not only are the symptoms greatly exaggerated, it may be to the point of severe illness during the summer months, but in most cases headache and great distress are produced by going into a hot room even in winter.

The treatment is, first, absolute avoidance of any exposure to even moderate heat, combined with intellectual and physical rest; sec-

ond, the treatment, counter-irritation, fly-blister, actual thermo-cautery, combined with the internal administration of mercurials, and potassium iodide in very small continuous doses (one-fifth grain of corrosive sublimate, one to two grains of iodide, three times a day); third, restriction to a largely farinaceous, non-irritating diet, and careful attention to all minor symptoms as they arise. (Fitz, M. D.)

CHAPTER XXVIII.

ENTERIC OR TYPHOID FEVER.

Definition.—This is an acute infectious disease due to a specific cause. It is characterized by gastro-intestinal catarrh, febrile movement of continued type, varying in duration from ten to twenty days, and even longer, marked prostration, rapid wasting, mild nervous symptoms, and a scanty eruption of isolated, slightly elevated, rose-colored spots, disappearing on pressure and developed in successive crops. Enteric fever in infancy and childhood does not conform closely to the type of the affection in adult life.

Symptoms.—Infantile remittent fever; nervous fever; infantile hectic fever; gastric fever; acute mesenteric fever; entero-mesenteric fever; intestinal fever; pathogenic fever; typhus abdominalis fever; ileo-typhus fever.

The names by which this fever has been described at various periods and by different authors are derived from its supposed relationship to typhus, its mode of prevalence, its remittent character, its long duration, its supposed nervous origin, the occurrence of septic or putrid symptoms, its hectic phenomena, the presence of symptoms denoting disturbances of the stomach and liver, the intestinal symptoms, the morbid anatomy, and its mode of origin.

We do not consider it necessary, however, to enumerate all these names, as many of them have fallen out of use.

Etiology.—Enteric or typhoid is due to the entrance into a susceptible organism of a specific infecting principle. The etiological consideration relating to enteric fever is equally applicable to childhood and to adult life.

Predisposing Influences.—These are all conditions which favor the development and accumulation of the infecting principle, and those conditions which increase the susceptibility of the individual to the cause of this particular fever and the liability of exposure to it.

The geographic distribution of enteric fever is wide. In America it prevails as the common fever from Hudson Bay to the Gulf of Mexico. In new and sparsely-settled districts, where the land is being gradually brought under cultivation, the malarial fevers occur; after a time, as population increases, the malarial disease and enteric fever will prevail side by side; finally, when the land has been generally taken up and drained, and tilled for some generations, and villages and cities abound, the malarial diseases, true ague and remittents, impress communities but faintly, or disappear altogether, while

enteric fever becomes common, and asserts itself as the predominant endemic fever in proportion to the neglect of the sanitary measures by which alone it can be kept in check in populous localities.

Climate, not of itself, but indirectly or as determining the mode of life in communities, has a manifest influence upon the extent of the prevalence of enteric fever. Neither is it by any means confined to temperate climates; it is not uncommon in tropical and subtropical countries.

The season of the year is a predisposing cause of great importance. Hirsch found that 519 epidemics of typhoid were distributed among the seasons as follows: In the spring, 29; in the summer, 132; in the autumn, 168; in the winter, 140. The number of cases in localities where the disease is endemic is usually greatest from August to November, decreasing in December, and is lowest from February to May, and again increasing in June. In some districts of the United States the popular name is "autumnal" or "fall fever."

The state of the weather as regards dryness and moisture exerts a remarkable influence upon the prevalence of enteric fever. Hot and dry summers favor the development of the disease; cold, wet summers check it. This statement is supported by the current testimony of observers in all countries. Dryness of the atmosphere alone does not, however, lead to an increase of enteric fever. In cities and other localities possessed of a system of underground drainage, warm, damp weather often leads to an outbreak of the disease, while heavy rainfalls, by flushing the drains, remove the cause to which its origin and spread are chiefly due. On the other hand, outbreaks of enteric fever may be traced to the influence of abundant rains in washing the germs of the disease into the water used for drinking purposes, particularly where the water supply is derived in part from tilled and therefore manured fields.

Age is of great importance among the predisposing causes of enteric fever. This affection is preeminently a disease of adolescence and early adult life. The period of greatest susceptibility lies between the ages of fifteen and thirty, and the liability diminishes progressively both above and below these limits. Cases in the first year of life are exceedingly rare; but from this period (after the first year of life) through infancy and childhood, the liability is fully established. It is said that enteric fever is not common in advanced life, though well-authenticated cases in persons seventy and eighty years of age have been reported. Sex, in childhood, exerts no influence whatever as a predisposing cause.

The mode of life is also without influence; enteric fever is as common in the houses of the rich as in the most crowded and destitute localities.

Persons changing their residences from one part of the city to another, or from the country to the city, very frequently become subjects of the disease.

The Exciting Causes.—It is regarded as settled that the cause of typhoid fever is a specific, organized, pathogenic germ.

Numerous observers, Eberth, Klebs, Koch, and others, found bacilli in Peyer's patches, the mesenteric glands, and the spleen, from cases of this disease. Gaffky[1] found this organism in the mesenteric glands, liver, spleen, and kidneys, of twenty-six of a series of twenty-eight cases of enteric fever which he investigated. The subjects in which these bacteria were found had died in the earlier stages of the disease. Gaffky was unable to determine the presence of the typhoid bacilli in the blood or in the intestinal contents.

This micro-organism, which is, then, the infecting principle of typhoid fever, is invariably derived from a previous case. It is said that there is no proof whatever that enteric fever can, in the absence of the specific, pathogenic germ of typhoid fever, be produced by the products of decay or decomposition, by tainted food, or by the action of other bacteria; nor is there any reason to believe that typhoid bacilli can be developed from other micro-organisms.

When introduced into the human body, this germ is capable, under favorable circumstances, of indefinitely reproducing itself. It is eliminated with the fæcal discharges. It retains its activity, when it has found its way into favorable situations, for an indefinite period after it has passed out of the body, the requirements to this end being decomposing animal matter, especially fæcal discharges and moisture. Therefore, cesspools, sewers, drains, dung-heaps, and wet, manured soils favor its prolonged existence. It is capable of indefinite multiplication in these favorable situations. It remains suspended in, and may be conveyed by, water and milk. These fluids become the means of conveyance for the enteric-fever germ to the interior of the organism; it is thought probable that it may also, under certain conditions, float in the atmosphere and thus occasionally find its way into the body by means of the inspired air. The germ retains its power of growth and reproduction within wide ranges of temperature. Prudden[2] found it capable of growing after having been frozen in ice for one hundred and three days, and after having been heated to a temperature of 132.8 degrees Fahrenheit. He also found that it retained its vitality after repeated alternate freezing and thawing. The investigations of Seitz, Wolfhugel, and others, show that it grows abundantly in milk.

The fact that the infecting principle of enteric fever retains its vitality and is capable of multiplication in water of various temperatures has been fully established by the great number of carefully-studied outbreaks in the past. Among others, the well-known epidemic of North Boston in 1843, described by Dr. Flint; the epidemic at Lausanne in the canton of Basel, Switzerland, and in 1872, and the

[1] Mitth. A. D. Kaiseri. Gesund-Amt. Bd. 11, 1884.

[2] *Medical Record*, IX, 1887.

extensive outbreak of Plymouth, Pennsylvania, in 1885, have attracted special attention.

The bacillus probably always infects the human individual through the intestinal tract. In the majority of cases it reaches it in the drinking water, although in numerous instances it has been carried by infected milk, and some very severe epidemics have been produced by eating oysters which have been planted near the discharging mouth of sewers. The researches of Chantemesse and Widal and Neuhaus seem to establish the fact that the microbe in question is able to pass by way of the placenta from the blood of the mother to that of the fœtus.

The period of incubation varies within wide limits; its precise determination in any given case is by no means so simple a matter as would at first sight appear. In an outbreak which occurred at Guildford, England, in 1867, the contaminated water which was the cause of the infection was supplied on a single day, the 17th of August. A large number of cases came under observation on the 3d and 4th of September, a period of incubation covering seventeen or eighteen days. On the other hand, there are facts tending to show that this period may be as short as two or four or eight days.

The occurrence of house epidemics is to be explained by infection at the same time or in quick succession of a number of individuals from the same source; of cases developing in patients occupying beds adjacent to those of typhoid-fever cases in the wards of a hospital, by the conveyance of infecting material contained in the fæcal discharges from one patient to another through the neglect or carelessness of the attendants.

Pathology and Morbid Anatomy.—The bacillus or spores, being swallowed, gain entrance to the organism by means of the intestines. This may be assumed to be the case, it is said, in those instances where the germs reach the organism by means of inspired air, as it is probable that they are engaged in the mucus of the mouth and then swallowed. If not destroyed in the stomach, the bacillus retains its vitality, passes on into the alkaline contents of the intestines, and here finds conditions favorable to its further development. In cases examined post mortem in the earliest stages of the disease, the lesions are mainly confined to the lymphatic tissues of the intestines. The bacillus penetrates into the solitary follicles, and there multiplies and forms colonies. From these colonies they migrate by way of the lymphatic vessels to the mesenteric ganglia, and by way of the radicels of the superior mesenteric vein to the liver, to be finally distributed by the blood current to the spleen and other organs.

A knowledge of the causative influence of the typhoid bacillus in the production of enteric fever, and of the mode of distribution of these germs in the various organs, fails to account adequately for the symptoms of the disease. It is probable, though, that certain of the intestinal symptoms of enteric fever are due to the direct action of the

typhoid bacillus; but the constitutional symptoms, including the fever, must be explained by the continuous action of a chemical poison produced by the growth and multiplication of these organisms within the body; especially is this true of the nervous and vasomotor phenomena, the feeble circulation, dicrotism, relaxed capillaries, flushed face, dilated pupils, and delirium.

Anatomically, it is said, it is important to bear in mind that the characteristic lesions of typhoid fever, which are in the intestines and in the mesenteric lymphatic glands, do not constitute the disease; but that the chemical poison produced by its specific cause is taken up by the fluids of the body, and gives rise to general disturbances, which are present in all fully-developed cases, and which manifest themselves at a very early period in the attack; therefore the anatomical lesions fall naturally into two groups.

The first embraces those arising from the local action of the typhoid bacillus and the concentrated ptomaine which they produce, and includes changes in the lymphatic system of the intestinal canal.

The second group includes lesions which are not the direct result of the local action of the bacilli, but are due to constitutional infection. They consist of degenerative changes involving the tissues of the various organs, and are to be found generally manifested throughout the body, and particularly in the liver, the kidneys, the voluntary muscles, the heart, the salivary glands, and the pancreas.

The marked disturbances in the function of the nervous system indicate profound nutritive derangement, the nature of which is at present unknown.

The changes of the second group are not peculiar to enteric fever; they occur in other acute febrile diseases, and must be ascribed to the action of the various special toxic principles to which the phenomena of such diseases are due. These anotomical changes attain their fullest development in enteric fever, however, for the reason that in this disease the organism is continuously subjected to the action of these toxic principles for a prolonged period.

The lesions in childhood are, as a rule, less extensive and conspicuous than in adults, just as the disease itself is less intense. They have been also less thoroughly studied, by reason of the favorable course of the disease in childhood, and the consequent low rate of mortality.

The Digestive Tract.—Inflammation of the mucous membrane of the stomach is common in typhoid as in other acute febrile diseases.

The duodenum usually presents no anatomical changes.

The jejunum and upper part of the ileum may be distended with gas; the lower portion of the ileum is usually collapsed.

The tympany which belongs to the disease is chiefly due to the presence of gas in the colon; invagination of the intestines, unaccompanied by evidence of inflammation, is occasionally met with at one or more points.

The constant and therefore characteristic lesion is an affection of the solitary and agminate glands in the lower part of the ileum. The lymphatic follicles of the cæcum are usually involved, and not infrequently those of the colon also.

First Stage.—The first stage is characterized by a swelling of the glands, with surrounding hyperæmia. The Peyer's patches project above the surface of the surrounding mucous membrane in the form of flattened, oval plaques with a reticulated, mammillated surface and elevated margins. The solitary follicles, which are not constantly implicated, form, when affected, discrete, shot-like projections, varying in diameter from one-eighth to one-fourth of an inch. These changes are always progressively advanced in the lower part of the ileum, reaching their full development in the neighborhood of the ileocæcal valve. This glandular swelling is due to extensive hyperplasia of the lymphatic elements. The cellular infiltration extends downward into the submucous tissue, but at the borders of the patches is more or less abruptly limited. It attains its maximum about the end of the first week.

Second Stage.—The infiltrated lymphatic tissue now undergoes necrosis. The mass changes to a dirty yellow color and becomes more opaque, and the lymphatic follicles, with the epithelium covering them and some of the surrounding tissue, break down at scattered points, so as to form an irregular or ragged ulcerated surface, or *en masse* into one large slough. This slough, stained a deep yellow or brown by the intestinal contents, remains attached for a time. It is then gradually cast off, either in a single piece or in fragments; this process occupies another week, so that the separation of the slough takes place at the end of the second or early in the third week. In the greater number of instances of enteric fever in childhood, the sloughs are superficial and of limited extent, and the ensuing ulceration undergoes prompt cicatrization.

Third Stage.—The ulcer thus formed, as a rule in adults, but exceptionally in childhood, has a smooth floor, and abrupt and to a certain extent overhanging edges.

Healing of the ulcers begins during the fourth week, and extends over a period of a fortnight, the scar becoming covered with epithelium and showing no tendency to contraction. In protracted cases the healing of the ulcers extends over a longer period, and in relapsing cases the stage of medullary infiltration may be renewed, and generally it ends in resolution.

From the detachment of the slough occurs the danger of hemorrhage, which is usually gradual, though sometimes profuse and immediately fatal.

In the former case the blood is intimately mixed with intestinal contents, or forms a continuous or broken clot; in the latter the intestinal contents are liquid blood. Perforation of the wall takes from the extension of the ulcer in depth, and is, as a rule, preceded by the

formation of fibrinous adhesions between the peritoneum at the base of the ulcer and that contiguous. The base of the ulcer, if gangrenous, yields to the pressure of the intestinal contents or to intestinal peristalsis and is torn through; thus the intestinal contents escape into the peritoneal cavity, causing a general peritonitis. A localized peritonitis may take place when the sloughing ulcer is in the vermiform appendix, or when the peritoneal surface of the intestines is firmly attached to the adjacent peritoneum.

The spleen is also hyperplastic, and during the second week may become tripled in size, except when it is atrophied or its capsule indurated. Hemorrhagic infraction and abscess of the spleen may occur as complications.

The heart, liver, and kidneys show granular degeneration of protoplasm, characteristic of infectious diseases. The heart is opaque, gray, and flaccid; the liver is enlarged, opaque, gray, the lobular regions indistinct.

Ulceration of the larynx, catarrhal bronchitis, and lobes and lobular pneumonia are frequent. Meningitis at times follows a complicating inflammation of the middle ear or acute parotitis. Venous thrombosis, especially of the veins of the leg, is not infrequent, and sometimes proves a cause of fatal embolism during convalescence from the fever. Orchitis sometimes occurs.

Symptomatology.—In adults, typhoid may begin abruptly with a chill; in most cases its development is so insidious that it is almost impossible to fix the date of the attack, weariness, malaise, epistaxis, headache, slight aching pains in the legs, increasing weakness, and accelerated pulse, with slight diarrhea, being the only manifest symptoms. During this stage there is commonly in the evening a slight elevation of the bodily temperature, which, as the disease progresses, takes upon itself the peculiar almost characteristic temperature rhythm of typhoid fever.

The course of enteric fever in children is not only as a rule much lighter, but it also lacks the well-marked sequences of phenomena which characterize the evolution of the sickness in the later periods of life. We do not recognize in children the distinct periods into which the course of the disease in adults is divided more successfully, in accordance with the stage of development and the successive prominence of special symptoms. Nor are we able, as a general rule, to divide satisfactorily the febrile movement into the two distinct and well-defined stadia usually seen in adults. As is well known, the first stadium corresponds to disturbances of the organism due to special infections, and it is in this period that pathologists have been able to recognize in the blood and tissues of the body the typhoid bacillus. The fever is of the subcontinuous type. The second stadium, on the other hand, corresponds to that period of the disease intervening between the formation and separation of the intestinal sloughs, and the convalescence. The fever, instead of being subcontinuous, is distinctly remittent, and

presents the characteristic of surgical or hectic fever, which is without doubt due to an infective process analogous to that which occurs in those conditions, and not to any specific action of the typhoid infection.

In children this second stage is imperfectly developed, short in duration, often absent altogether,—a modification of the course of the fever as seen in adults which is in close accord with the fact that in the earlier periods of life, the intestinal lesions frequently undergo resolution wholly without ulceration, or more commonly present some superficial sloughing and ulceration, and only exceptionally reach the higher grade of development which is the rule in adult life.

To make this more clear, we may consider a corresponding state of affairs as regards the course of the temperature presented by scarlet fever. When this disease runs its course without complication, the temperature curve presents a single stage, and terminates in the course of eight or ten days, usually by a somewhat prolonged critical defervescence. When, on the other hand, it is complicated by secondary infection and an inflammatory implication of the parotid gland, the middle ear, or the lymphatics of the neck, the febrile movement of the primary infection is succeeded by a hectic fever and suppuration, and a second febrile stadium shows itself, which may indefinitely prolong the sickness.

In typhus fever we have a fever without constant or distinct local lesions; we have a single febrile stage due to the specific infection, which usually terminates by the tenth or twelfth day.

Another usual modification of temperature in childhood consists in the greater extent of the morning remissions and the evening exacerbations. There is a ready explanation in the labile tendencies of the temperature of childhood under all circumstances, and it is to some extent a trait of every febrile disease in early life.

The well-known tendency of delirium to take its form from the development and mental habit of the individual in sickness of every kind, will serve to explain the fact that in childhood, apathy, somnolence, and stupor are much more active, or even wandering delirium.

A stage of prodromes usually precedes the outset of the fever, which is so insidiously developed that it is impossible to designate the day of its commencement. Patients are noticed to be easily fatigued and indisposed to play. They complain of feeling badly, and of headache, especially frontal headache, which is usually worse toward night. They complain also of pain and soreness in the muscles, and the sleep is restless and broken. The bowels are, as a rule, constipated; the expression is dull, the appetite poor, the tongue coated. This period is of uncertain but brief duration; it gradually merges into the declared disease; slight, irregular chills or repeated attacks of chilliness may mark the beginning of the fever.

The disease is sometimes preceded by an attack resembling inter-

mittent fever. Here the fever speedily assumes the remittent type, and the charactistic symptoms of enteric fever are developed.

The attack is to be regarded as beginning with the first chilliness or the first rise of temperature; the fever increases, but it is distinctly remittent in type, the exacerbations occurring in the afternoon or evening and the remissions in the morning. The progressive rise in temperature often lacks the regularity seen in adults, nor is the rash or acme, which is usually reached by the evening of the fifth day, as a rule so high.

The skin becomes dry and hot; not infrequently, however, especially in the early part of the day, it is moist or even bathed in sweat. The headache becomes more marked. Epistaxis sometimes occurs. It is usually slight, not exceeding a few drops; at other times it may be considerable in amount. The expression is dull and apathetic, the countenance pale, and the cheeks slightly flushed. Sleep is more restless than before, and often disturbed by cries and jactitation. In the ordinary cases seen in childhood pronounced delirium is uncommon; when present it usually occurs between sleeping and waking and is transient. The lips are parched and dry and speedily become fissured and scaly. The tongue is usually moist, red at the tip, and covered with a whitish-yellow fur, which is sometimes thin, sometimes thick and pasty. Appetite is lost, thirst augmented. Constipation is much more frequently present in children than in adult life; nevertheless diarrhea may be present from the period of prodromes until convalescence.

In the full development of the disease, the abdomen has usually some prominence, which is very exceptionally distended or tense. There is often tenderness upon pressure, particularly in the region corresponding to the ileocæcal valve, and upon palpation gurgling is produced. In the majority of cases the spleen is enlarged. Cough, usually slight, is apt to be present and upon auscultation a few scattered coarse mucous rales may be detected posteriorly. The eruption appears somewhere between the fifth and tenth days of the attack. It is commonly sparse, scattered over the abdomen or lower part of the chest and upon the back. It may be absent altogether; when present, it is characteristic of the disease.

The urine, which during the course of the disease is scanty and highly-colored, presenting the usual characteristics of fever-urine, becomes with the defervescence limpid and abundant.

Toward the end of the second week the subcontinuous fever of the acme assumes a distinctly remittent type, and defervescence takes place by rapid lysis. Coincidentally with this change, general improvement takes place. Defervescence is, as a rule, completed somewhere between the tenth and twentieth days, and the child enters upon convalescence pallid, feeble, and emaciated out of proportion to the symptoms of his sickness. Thirst diminishes; appetite returns; mental anxiety quickens; and the restoration to health is more rapid than in adult life.

Relapses occur in a certain proportion of cases in childhood and infancy. What proportion can not be stated positively. They appear to be much less common than in adult life.

The relapse constitutes a true second attack of the specific fever. It is due to reinfection, probably from some source within the organism itself, and is attended by the characteristic phenomena of the disease. It is, as a rule, however, of more abrupt onset and shorter duration than the primary attack.

It is to be noted that during this period, in cases in which relapse occurs, the spleen remains enlarged. The relapse is not invariably thus separated from the primary attack, but may occur during its course. It is then termed an intercurrent relapse; and it is to intercurrent relapse that cases of unusual prolongation, in the absence of complications, are to be ascribed. Two or more relapses may occur. An attack of typhoid fever appears in the great majority of cases to confer immunity aganst subsequent attacks. It is said, however, that to the immunity often acquired in infancy or childhood the insusceptibility of many adults to the disease is to be attributed.

Very mild cases doubtless frequently escape recognition. The little patient, though far from well, continues to play about with its companions. These cases do not correspond to the "walking typhoid cases" of adult life.

The intestinal lesions being superficial, the attack is not likely to terminate in hemorrhage from the bowels or in perforation.

PRINCIPAL SYMPTOMS.

THE TEMPERATURE.

The typical temperature range, which is of diagnostic importance in adults, is rarely seen in childhood.

Owing to the difficulties of diagnosis at the beginning of the attack, which are much greater in childhood than in adult life, and to the insidious development of the disease, accurate temperature observations of the earlier periods are not often taken. Even when cases develop in the families of well-to-do people, and thus come comparatively early under the observation of the physician, the morbid phenomena are not usually such as to lead immediately to the anticipation of a serious disease, nor are there such obvious evidences of fever as to suggest the systematic taking and recording of the temperature.

In those rare instances when the fever begins suddenly with a chill, followed by a rise of several degrees in the temperature and sweating, there remains the possibility of a previous insidiously-developing febrile movement which has been overlooked. In these cases the rise in temperature following the chill is abrupt, often reaching 103.5 to 104 degrees Fahrenheit. Much more common is a gradual rise in temperature, the curve taking the form of an irregular zigzag, and the eve-

ning exacerbation exceeding the remissions of the following morning by about one degree Fahrenheit, so that the fastigium is reached in the later days of the first week. Here the initial is absent, but there is often a slight sense of chilliness or transient shivering during the early days at the time of the evening exacerbation. The fastigium having been reached, the type of the fever becomes subcontinuous, the difference between the evening and the morning temperature being about a degree and a half.

At some time between the end of the second and the middle of the third week, or exceptionally even later than this, the type of the febrile movement gradually becomes distinctly remittent or even intermittent, the remissions and exacerbations being gradually increased. The defervescence thus assumes the form of a rapid, gradual lysis, the fever terminating when the evening temperature falls to normal.

In a considerable proportion of the cases the defervescence takes place by a rapid lysis, without the intervention of distinct remissions or intermissions, the fall being of an irregular zigzag not unlike that which marks the access. Less frequently—and this is especially the case where the duration of the fever is relatively short—the defervescence takes place with considerable rapidity, in itself suggestive of crisis. This is the well-known mode of termination in the abortive cases seen in adult life.

In the early days of convalescence the morning temperature, and at times the evening temperature also, falls to subnormal ranges. During convalescence the temperature is exceedingly unstable. Transient perturbations, with a rise of three or four degrees to which the term recrudescence of fever has been applied, are brought about by slight causes, among which are errors in diet, especially the eating of meat or fried chicken, constipation, undue muscular effort, and mental excitement.

The temperature range, alike during the fever and during convalescence, is liable to modifications in consequence of complications. Abundant loss of blood from epistaxis or from intestinal hemorrhage is apt to be followed by a considerable fall of temperature. This fall is not permanent unless it occurs during the defervescence.

The temperature of the disease in children reacts promptly and decidedly to antipyretic treatment. The height of the fever in the fastigium is variable. In many cases it does not exceed 102.5 to 103 degrees Fahrenheit. Exceptionally it reaches 104 degrees or even 105 degrees. The average difference between the morning and evening temperature is, as a rule, about a degree or a degree and a half. There is occasionally observed a slight exacerbation occurring early in the afternoon, followed by a correspondingly slight remission. The maximum temperature is reached in the evening. Where, in the course of twenty-four hours, two temperature observations only are made, the most convenient time is between seven and eight in the morning and between seven and eight in the evening. In grave cases, and where the temper-

ature is either very high, or shows a tendency to sudden changes of considerable extent, observations should be taken much more frequently. A temperature of inverse type has been occasionally noted. Hyperpyrexia, the temperature reaching 105.8 degrees Fahrenheit, and rapidly rising to 108 to 110 degrees Fahrenheit, does not occur in uncomplicated enteric fever in childhood.

THE CIRCULATORY SYSTEM.

In mild cases the action of the heart is but little disturbed; in those of moderate severity it is progressively diminished until the impulse and the first sound are much enfeebled. These changes are less marked, as a rule, in infancy and childhood than in cases of corresponding severity in adult life.

Pericarditis is rare, and is looked upon as a complication when it occurs. Actual endocarditis of a mild grade is probably of more frequent occurrence than the description of the text-books would indicate. Sudden death in the absence of adequate anatomical lesions, such as occasionally occurs in adult life, it is said does not take place in enteric fever in childhood. The pulse in children corresponds in a general way to the height of temperature. The exceptions to this rule are very frequent, a pulse of 120, 108, or even 96, being occasionally met with where the temperature ranges as high as 103 or 104 degrees Fahrenheit.

On the other hand, the pulse may be exceeding rapid, reaching a frequency of 150 or 180 in cases that terminate in recovery. It is sometimes irregular both in rhythm and in force. Picrotism is much more rare in childhood than in adult life; but we must, in this connection, again insist upon the fact that the phenomena of enteric fever in later years of childhood closely correspond to those of the disease in adult life.

The peculiarities of the pulse in infancy are said to be due to the narrowness of the arteries, which make it difficult to recognize beyond the fact that it is always small and compressible. Extreme irregularity of the pulse is a grave symptom.

During convalescence the pulse is apt to be more rapid than in health, and to show marked variation in frequency. It is, on the other hand, not rarely slower than normal.

The œdema of the ankles and legs, often seen in the early days of convalescence, must be ascribed to the weakness of the heart and imperfect circulation of the blood. Collapse is rare in childhood. It occurs only in the graver cases, and may result, as in adult life, from various accidents, among which are intestinal hemorrhage, the shock following perforation, or even sudden copious diarrhea or violent vomiting.

THE RESPIRATORY SYSTEM.

In the absence of pulmonary complications, the frequency of the respiration varies with the intensity of the febrile movement. The

respiration rises with the pulse, but in cases characterized by an unusually slow pulse there is no corresponding slowness of the breathing.

A certain amount of bronchial catarrh is so frequent that it merits consideration as a phenomenon of the disease rather than as a complication. Cough is much more common in children than in adults, although the corresponding physical signs are in many cases not present, a fact to be accounted for by the superficial respiration of childhood and the impaired muscular tone of the disease. For the same reason, the respiratory murmur is ordinarily much enfeebled. Upon deeper inspiration, such as accompanies crying or coughing, moist rales are distinctly heard. In other cases dry and moist rales are to be heard over all parts of the chest.

In a majority of the cases the bronchitis is of moderate intensity, especially if the patient receives proper care and treatment. In severe cases, however, there is frequently developed broncho-pneumonia, which manifests itself by notable enfeeblement of the respiratory murmur of the dependent portions of the lungs, and by impairment of resonance upon percussion. These changes are apt to affect both lungs, although, as a rule, the signs are somewhat more pronounced upon one side than upon the other side. They are largely due to the condition of the nervous system. The patient expectorates little, is apt to swallow food the wrong way, and lies quietly upon his back. This form of pneumonia occurs during the acme of the febrile movement, or early in the defervescence, and frequently amounts to a complication which prolongs the febrile process.

Hypostatic congestion also occurs in consequence of the feeble circulation; it is limited to the posterior parts and bases of the lungs.

Fibrinous pneumonia rarely occurs as early as the second day, or even during the first week, and it may attack the lower as well as the upper lobes. In cases where it comes on very early, the diagnosis is for a time obscure. It may sometimes occur during convalescence. It remains an open question as to whether or not this form of pneumonia, occurring in the early period of the disease, is due to a pulmonary localization, or to an independent coincident infection.

The same statement is said to be true of pleurisy with fibrinous, serous, or purulent exudation,—a complication, however, which is rare.

Henock has noted in a girl aged four years the occurrence of gangrene of the lung in pneumonia occurring as a complication of enteric fever.

Catarrhal laryngitis with hoarseness, due to the same causes that produce the bronchitis, is occasionally encountered. Ulceration of the vocal cords or of the posterior wall of the larynx, are more rare in this country than in Europe. (Keen.) Perichondritis of the arytenoid cartilages has also been observed. This is a complication of grave import, and may lead to rapid development of œdema of the glottis. Facial and laryngeal diphtheria may also occur as complications. Stenosis of the larynx may occur as a result of, first, œdematous laryn-

gitis; second, ulcerative laryngitis; and third, laryngeal perichondritis. In ninety-four cases collected from various sources by Keen, in which the age is regarded, six were under the age of fifteen years. Ulceration of the nasal cartilages, resulting sometimes in perforation of the septum, sometimes in a permanent deformity of the nose, also occurs.

THE DIGESTIVE SYSTEM.

In the digestive organs the symptoms of disturbances are much the same in childhood as they are in adult life. Loss of appetite during the progress of the fever is the rule; upon the occurrence of convalescence, there is usually marked hunger. Thirst is a prominent symptom, but it is generally of moderate amount and readily gratified.

The tongue is moist, and is, in exceptional cases, clean throughout the attack. It is much more commonly red at the tip and edges, and covered with a pasty, yellowish-white fur, which is apt to separate in the course of the disease, leaving the tongue smooth, bright red, and dryish. We do not, as a rule, find in childhood the hard, dry, brown tongue which is so common in the later stages of the disease in adults. Sordes upon the teeth and gums are not common in childhood; the lips are apt to become cracked and fissured, with the formation of superficial crusts; superficial apthous ulcerations likewise occur upon the tongue, upon the buccal mucous membrane, and at the corners of the mouth.

Vomiting, sometimes spontaneous, sometimes following the administration of food or medicine, occurs much more frequently in children than in grown persons; but this symptom is more common in the first week of the attack, and may occur from time to time throughout the whole course of the disease.

Repeated vomiting occurring at the beginning of the attack tends to increase the resemblance between enteric fever and tubercular meningitis, and renders the diagnosis for the time somewhat obscure.

The condition of the bowels is extremely variable, constipation being about as frequent as diarrhea in the beginning of the attack. In many cases the bowels are almost normal as regards the frequency of the movements and the consistency of the dejections throughout the disease. When constipation exists in the beginning of the disease, it is liable to give way to a more or less frequent diarrhea on the later course. The number of passages may vary from one to ten, even fifteen or more, in twenty-four hours. When the movements are frequent, the dejections are often formed of a mushy consistence, being usually of a lightish-yellow color; when diarrhea is present, they usually present the well-known thick "pea-soup" appearance, and divide, upon standing, into an upper cloudy-liquid layer, and a lower layer composed of greenish-yellow masses. The discharge from the bowels is sometimes of a rather bright greenish color.

Diarrhea, when present, is apt to continue until defervescence is

completed, and to be succeeded during the convalescence by constipation, which, when obstinate, is not infrequently a cause of transient recrudescences of the fever. On the other hand, it happens occasionally during convalescence that spontaneous diarrhea occurs.

Except in the case of very young infants, involuntary evacuation of the bowels or bladder in bed is unusual. Later, in the course of severe cases, involuntary discharges are apt to take place. The belly is often slightly sensitive, but tenderness is extremely rare. It is more apt to be present in constipated cases. It is more difficut to determine the presence or absence of local tenderness upon pressure in the ileocæcal region in children than in adults. For this reason the symptom is less important. The abdomen is usually normal in contour or moderately distended; in some cases it is flat. Marked tympany is comparatively rare in childhood.

Abdominal pain is usually absent. Sharp attacks of colic, especially just before an action of the bowels, occur occasionally.

Intestinal hemorrhage occurs as the result of the implication of the walls of the blood-vessels in the ulcerative process. It is apt to occur at the time of the separation of the sloughs, namely, comparatively late in the course of the attack.

Hemorrhage from the bowels is in all cases a significant symptom. Even slight hemorrhage may be followed after some hours or days by a dangerous or fatal loss of blood.

After every intestinal hemorrhage of considerable amount, the anæmia characteristic of the period of the disease in which this accident is liable to occur, is intensified, and signs of collapse are apt to appear. The fall of temperature amounts, usually, to two or three degrees Fahrenheit, and may reach normal or even subnormal ranges.

Hemorrhage, even when large, does not necessarily result in a fatal issue of the case. Cases are reported where the hemorrhage seems to have exerted a favorable influence upon the cerebral symptoms, and occasionally it is followed by improved intelligence, permanent reduction of fever, and other signs of beginning convalescence. Very rarely the perforation of the floor of an ulcer into the peritoneal cavity occurs in children. If it does occur, it is apt to be late in the course of the attack.

Peritonitis may occur through direct extension of the intestinal ulceration of the serous membrane without actual perforation. Peritonitis arising in this manner may be either local or general. If the slightest amount of extravasation of the intestinal contents should find its way into the peritoneal cavity by the means of a perforating ulcer, there results a purulent or even an ichorous peritonitis, with the well-known symptoms of an attack of this form of serous inflammation. Abdominal pain, distention, collapse, eructations, and vomiting, a small and frequent pulse, rapid fall of temperature, followed by an abrupt rise and great fluctuations, constitute the two familiar clinical symptoms of this accident.

Enlargement of the spleen in enteric fever is looked upon as of some diagnostic importance. The splenic tumor may be made out as early as the third or fourth day; in many instances, not until the sixth or seventh or ninth day. The more rapid the rise of temperature, the earlier the spleen becomes enlarged. The enlargement of this organ subsides with defervescence; exceptionally the spleen remains enlarged for some days after convalescence is established.

Pain in the spleen is rare; it may result from laceration of a distended capsule.

THE NERVOUS SYSTEM.

The symptoms of disturbance of the nervous system are, as a rule, much less marked in infancy and childhood than in adult life. In some cases there are no nervous symptoms present throughout the whole course of the disease, though in a great number the nervous disturbances are manifested. Headache, increased toward evening, frequently occurs during the prodromic period and the first week of the disease. It is commonly referred to the forehead or temple, but it may affect the whole head; it is occasionally neuralgic in character, and may be intense; it usually subsides about the end of the first week.

In cases of moderate severity, the child lies with its eyes half closed, lightly somnolent, sometimes restless. When spoken to, it often turns away or answers in monosyllables, with evidences of irritation. Often, even in advanced childhood, the patient refuses to show the tongue, or, if it is showing, forgets for a few moments to draw it in again, unless told to do so. There is dulness of hearing, sometimes amounting to marked deafness. Dilatation of the pupils is common; sleep is restless and disturbed. Sometimes sleeplessness is a distressing symptom. Oftentimes dizziness is complained of. We also observe among the nervous symptoms cutaneous hyperæsthesis, which is often quite extensive.

Delirium is usually mild. It is more apt to occur in the evening or toward night, and is sometimes associated with night terrors. The common form in childhood is the so-called wandering delirium; it is apt to be transient and recurrent rather than continuous. The severer forms are not frequent, and are indications of grave cases. Sudden, sharp, and prolonged outcries are observed in children, with excitement not easy to pacify. In children at the age of puberty especially, the disturbances of the nervous system are often fully developed, so that we encounter active delirium accompanied by efforts to leave the bed; deep stupor, tremor of the hands and tongue, and slight twitching of the muscles of the face and of the tendons of the wrists and hands, also occur. Subsultus tendinum is the name given by the older writers to these motor disturbances. Grinding of the jaws occurs as an ominous symptom. Persistent tremor of the extremities and of the lower jaw is apt to be associated with increased tendon reflexes and mechanical excitability of the muscles. In deep coma the muscles become lax, the

movement of the eyes is no longer coordinated, reflex excitability is diminished, involuntary evacuation of the bowels takes place, and there is often retention of the urine.

Peraplegia, hemiplegia, and paralysis of the muscles of the eye and of the larynx are very rare. These accidents usually occur during convalescence; their tendency is to recover.

Aplasis is much more common in children than in adults. It is often complete. It usually appears during the fever period of defervescence or in the early days of convalescence, never during the height of the fever. It usually passes away gradually in the course of ten days or two weeks. As Bowers has pointed out, "Although there is almost complete speechlessness, there is no disorder of speech or partial loss of speech, such as occurs in cases of organic disease of the brain."

THE URINE.

Transitory albuminuria occurs with sufficient frequency to merit consideration as a symptom rather than as a complication. Bouchard has pointed out the fact that the bacillus typhosus is found only in albuminous urine. Enteric fever differs from scarlatina in the extremely rare occurrence of acute nephritis as a sequel. Retention of the urine is much less common in childhood than in adult life, although it occasionally occurs; catheterization is then necessary. Great care must then be used in keeping the catheter very clean, as vesical catarrh, urethritis, and epididymitis are liable to result from want of antiseptic precautions. Polyuria has been observed in the course of the disease in children.[1]

Menstruation in girls at puberty is apt to be profuse and prolonged. In the case of a girl fourteen years of age, which is recorded, menstruation occurred for the first time during the attack and continued for a fortnight. This case was one of great severity, and terminated fatally.

THE SKIN.

The rose-colored spots peculiar to the disease differ in no respect from the eruption as seen in adults. They are to be looked for upon the abdomen, the lower part of the chest, and between the shoulder-blades; occasionally they are found on the inner surface of the thighs. As a rule, they are not numerous. The appearance of the eruption is usually coincident with the occurrence of the splenic enlargement. The eruption may sometimes be found as early as the fourth or fifth day, especially if the fever appears suddenly and increases rapidly in intensity. Sudamina (vesicles) occur in childhood as in adult life, due to free sweating, which occurs in the later period of the febrile movement.

True petechiæ rarely occur. They are of unfavorable prognostic import.

[1] "Diseases of the Nervous System," Amer. Ad., 1888.

Boils may occur; and abscesses in the integuments, the muscles, or the intramuscular connective tissue, are met with infrequently. Suppuration of the lymphatic glands of the axilla or in other regions may also occur. Superficial bed-sores may occur in children who are not carefully nursed. The hair falls out during convalescence. The nails, both of the hands and of the feet, show transverse markings that indicate impaired nutrition of the tissues during the attack.

Facial erysipelas occasionally occurs at the end of the attack or during convalescence in children as in adults; in children, it is a much less serious complication. It is apt to terminate critically in the course of four or five days. Gerent[1] collected sixty-four cases out of 3,910 cases at all ages, observed by various clinicians.

Suppurative otitis media, generally called one-sided, is by no means an infrequent complication. It is usually of moderate intensity, and if properly cared for, terminates in complete recovery during convalescence from fever.

Lesions of the Osseous System.—Inflammatory changes in the bones are relatively common in infancy and adolescence. The symptoms are local. There is pain, at first vague, speedily becoming localized, usually severe, lancinating, aggravated at night often to such a degree as to render sleep impossible. The pain is associated with great tenderness. Localized tumefaction of the soft parts, with or without redness, speedily follows. After a time fluctuation appears, and one or more fistulous openings are formed, which discharge a small quantity of pus. The sinuses frequently close spontaneously, only to open again. The usual termination is in suppuration and necrosis.

Lesions of the bones are more common during convalescence from prolonged attacks. They are due to disturbance in the blood supply. Traumatism is said to play only a secondary part in their causation. Early surgical intervention is urgently demanded. Spontaneous dislocations are among the rare accidents of enteric fever in childhood. They have been described by Keen, who collected forty-three cases, at all ages, in which spontaneous dislocation occurred,—twenty-seven times in the hip, twice in the shoulder, and once in the knee. Fifteen of the hip cases occurred in enteric fever, and of these a number were in children under fifteen years of age.

Complications and Sequeli.—In the foregoing analysis of the special symptoms it has been necessary to allude frequently to complications of enteric fever; only a few additional remarks are now necessary.

It has been said that no hard and fast lines can be drawn between the complications of an acute febrile disease and the mere intensification of certain processes with corresponding prominence of local symptoms. Intestinal hemorrhage, perforation, and peritonitis are all regarded as complications. Atrophy of muscles, abscess of muscles, parotitis, and nephritis are in the category of sequeli. "The category to which hypostasis, œdema, thrombosis, embolism, and infarction, with

[1]These de Paris, 1883.

the result, should be referred is a matter of opinion. Whether these processes should be regarded as belonging to the primary disease, or as complications of it, would depend, to a great extent, upon the prominence of the morbid phenomena to which they give rise. On the other hand, pneumonia, erysipelas, phlegmonous abscesses, diphtheria, and other septic processes, are obvious complications, concerning the relation of which to the original disease there can be no question."

Scarlatina may immediately precede, coexist with, or follow enteric fever. Taupin, Murchison, and others have recorded instances in which patients suffering from scarlet fever have developed enteric fever, or in which the enteric fever has merged into scarlatina, and other instances in which the eruptions of the two diseases have coexisted.

The writer has known measles to develop during the course of typhoid fever.

Cases of pertussis are reported to have occurred during a course of enteric fever.

The coexistence of diphtheria and enteric fever is much more frequent.

Tuberculosis occurs during or immediately after enteric fever; hence pulmonary phthisis is not a rare sequel. Tuberculous meningitis and tubercular ulceration of the intestines are also encountered as sequels.

Diagnosis.—In well-developed cases of typhoid fever in childhood, after the first week it is not usually difficult to diagnose. During the first week, however, it is often impossible to form a positive diagnosis. The nature of the disease may be suspected if there are febrile movements, with nocturnal exacerbations each night attaining a higher temperature, and especially if there are bleeding at the nose, diarrhea, either spontaneous, or readily produced by laxative, appreciable enlargement of the spleen, and headache.

The diagnosis of the developed disease rests upon the continuance of the febrile movement and the appearance of abdominal symptoms, namely, diarrhea, abdominal pain, moderate tympany, enlarged spleen, and gurgling of the bowels. If in addition to these symptoms, rose-colored spots appear, the diagnosis becomes certain. The importance of the light shed upon doubtful cases by coincident or recently preceding local epidemics or house epidemics of the enteric fever, must be remembered.

The differential diagnosis from other febrile disorders which more or less closely resemble enteric fever is, in the absence of the characteristic eruption and the abdominal symptoms, sometimes attended with considerable difficulty.

The diseases with which typhoid fever in childhood is likely to be confounded, may be divided into two groups; first, those which resemble it in the first week of its course; and, secondly, those which resemble it in its more advanced stages. To the first group belong simple con-

tinued fevers and the exanthematous diseases. Diarrhea is not, however, present in these diseases, nor is their outset characterized by the occurrence of marked prodromes. Furthermore, the character of the temperature range of all these affections differs greatly from that of enteric fever, being marked by an abrupt rise which lacks the distinct morning remissions of the typhoid and attains its maximum with greater rapidity. Moreover, simple continued fever comes to an end in less time than is required for the full development of typhoid fever. The exanthemata can not be distinguished from enteric fever with absolute certainty in their pre-eruptive periods; notwithstanding this, the presence of naso-pulmonary catarrh in a doubtful case would lead us to suspect measles, or a sore throat would lead us to suspect scarlet fever, while the intensity of the febrile movement and the lumbar pain in smallpox serve to distinguish it in its early stages from enteric fever.

After the first week, typhoid fever may in some instances be complicated or confounded with the following diseases: Remittent fever, smallpox, enterocolitis, peritonitis, meningitis, tuberculosis, and trichinosis.

REMITTENT FEVER.

Typhoid fever and remittent fevers not infrequently prevail together in malarial countries, and physicians practising in such regions are familiar with the form of the fever frequently designated typho-malarial, which is, in fact, enteric fever modified by malarial influences. On the other hand, severe remittent fever not infrequently presents clinical resemblances to enteric fever, particularly when complicated with marked intestinal symptoms. Thus, vomiting, diarrhea, splenic enlargement, cerebral symptoms, and the condition known as the typhoid state, may occur in both diseases. The more important points of distinction are found in the eruption and the subcontinuous or imperfectly remittent character of the temperature range in the second week of enteric fever and its longer course.

Occasionally there are reported cases where typhoid fever has run its course without the characteristic rose-colored rash. In view of this fact that in a small proportion of cases the eruption does not occur, the rash loses its diagnostic value in doubtful cases.

Murchison states that he has frequently known a copious eruption of lenticular spots to be mistaken for smallpox. The eruptions are generally unlike; they differ in date of appearance, in character, and in evolution. The rose-rash of typhoid rarely appears earlier than the sixth or seventh day of the illness, and it is only in exceptional cases that the rash is present upon the face. It disappears on pressure, and undergoes little or no change from the time of its appearance until it begins to fade; that of variola appears during or after the third febrile exacerbation of the initial stage, that is, upon the third day of the disease. Smallpox shows itself first upon the face and hairy scalp. From the beginning it is hard, shot-like, and acuminate: it undergoes char-

acteristic and unmistakable changes with great rapidity, and it leaves a more or less persistent conspicuous scar.

Influenza occasionally closely resembles enteric fever; pulmonary catarrh, deafness, epistaxis, and dried tongue are seen in both diseases. The differential diagnosis rests chiefly upon the occurrence of influenza in widespread epidemics, the short duration of the attack, the atypical temperature curve, and the absence of the eruption and the abdominal symptoms that are usually associated with the diarrhea in typhoid fever.

Enteritis and entercolitis may be confounded with enteric fever. These are, however, local diseases, the fever and constitutional disturbances of which are symptomatic. The spleen is not commonly enlarged; there is no rose-colored rash; the abdominal pain is more conspicuous and severe than that of enteric fever; and the whole attack is comparatively of short duration.

Peritonitis, due to other causes than perforation, is to be discriminated from that arising from typhoid fever by the antecedent history of the case.

Meningitis, whether secondary or occurring in the form of epidemic or sporadic cerebro-spinal fever, presents marked points of difference from enteric fever; yet this disease has in some instances been at first mistaken for it. The differential diagnosis would be determined by the abrupt outset, the acute headache, the frequent vomiting, the constipation, the irregular temperature curve, the rapid evolution, and the herpetic and petechial eruptions of meningitis.

Acute tuberculosis presents many points of resemblance to enteric fever. The chief points of difference are these: In enteric or typhoid fever the temperature range is typical, or more or less conformed to a definite type, whereas that of tuberculosis is extremely irregular. In enteric fever diarrhea and some degree of tympany are common; in tuberculosis, diarrhea is rare, and the abdomen is apt to be flat and often scaphoid. In enteric fever, epistaxis, in the early part of the disease, is likewise rare, and the headache of enteric fever, as was pointed out by Dr. Jenner, disappears upon the occurrence of delirium, or may alternate from the beginning.

TRICHINOSIS (TRICHINA).

In trichinosis there is pyrexia, with vomiting and diarrhea. The rose spots do not occur, and epistaxis and enlargement of the spleen are rare, while, on the other hand, the severe muscular pains and tenderness due to the myosis peculiar to the disease, and the local and general œdemas which are almost constant symptoms in trichinosis, are absent in enteric fever.

Prognosis.—The death-rate among children in the first year of life is high, especially among the new-born. Statistics show, taking all cases together, that the mortality in childhood is decidedly lower than in adults.

Previous poor health of the patient tends to make the prognosis unfavorable, such as hereditary syphilis, local or pulmonary tuberculosis, chronic catarrhal bronchitis, previous unwholesome sanitary surroundings, improper food,—any cause tending to impair the powers of resistance of the organism, as do also the intensity of the infection as manifested by the rapid development of severe symptoms, intense pyrexia, failure of heart-power, ataxic phenomena, and the occurrence of multiple cases in the same house or in the immediate locality. Intestinal symptoms of a high grade, as copious diarrhea, metarism, abdominal pain and the like, also prolonged and intractable vomiting, have an ominous prognostic import. Finally, complications, as intestinal hemorrhage, perforation, local or general peritonitis, ulcerative endocarditis, meningitis, nephritis, diphtheria, croupous pneumonia, and pleural effusions, render the prognosis extremely grave.

Treatment.—This demands separate consideration, and we will consider, first, prophylaxia; second, general management of the patient and diet; third, special forms of treatment and the treatment of symptoms, complications, and sequels; fourth, the management of the patient during convalescence.

Prophylaxia.—A knowledge of the cause of enteric fever and the ways by which the disease is propagated, warrants the confident belief that it may not be greatly restricted in its prevalence, but may even be ultimately stamped out altogether. As in a vast majority of cases the typhoid bacillus finds access to the patient in drinking water, whenever there is an epidemic the water should be boiled for some minutes, or that which has been bottled and brought from some distant spring should alone be used.

The dejections should always be received into a bed-pan which has been previously disinfected with chlorinated lime, or a ten-per-cent solution of carbolic acid. If the lime is to be used, one-fourth of a pound of chlorinated lime is the quantity that should be placed in the pan; if the carbolic acid solution, one-half pint of a ten-per-cent solution will be sufficient to place in the pan before it is placed under the patient. When it is possible, the bed-pan should be emptied into a large receptacle containing a large amount of chlorinated lime, so that it shall be impossible for the bacillus to escape destruction; if an ordinary cesspool or water-closet is used for emptying the pan into, the fæces should stand for half an hour before being emptied, so as to insure the killing of all the germs. After emptying the bed-pan, it should be thoroughly washed with carbolic acid of five or ten-per-cent solution. There is little or no choice between the two germicides above mentioned. Care is necessary to see that the chlorinated lime is of good quality, and that it is used with sufficient freedom.

The bed and body linen of the patient should be changed daily and always immediately whenever they are soiled. Just as soon as they have been taken off, they should be tied tightly in a clean sheet and put into boiling water and boiled for not less than half an hour before open-

ing the boiler. If the circumstances are such as require the clothes to be sent away for washing, immediately after tying them up, the bundle should be thrown into a five-per-cent solution of carbolic acid and allowed to soak at least six hours before rinsing. In case of death a ten-per-cent solution of carbolic acid should be immediately injected into the rectum, and the corpse should be wrapped in a clean sheet wet with a three-per-cent solution of carbolic acid.

When it is practicable, the mattress and pillows should be protected by rubber covers. If the mattress is fouled by discharges, it should be soaked in carbolic-acid solution, and then taken to pieces. Under no circumstances should proprietary disinfectants be used; they are all more or less uncertain in action and greatly excessive in price. (Fitz.) A privy-vault requiring disinfection may be treated with two or three pounds of corrosive sublimate dissolved in a large quantity of water and slowly poured into the vault. During an epidemic, chloride of lime should be freely sprinkled over the surface of the contents every day.

Prolonged boiling will destroy the vitality of all known disease germs. There is no way better than disinfecting all clothing used about typhoid cases by means of boiling,—corrosive sublimate 1 to 1,000, or sulphate of copper of 1 to 100, or carbolic acid of 1 to 50, or chloride of lime of 1 to 100. The bleaching properties of chloride of lime must not be overlooked. Clothing should not be allowed to accumulate in a sick-room. Look to faulty drainage—that there is no pollution of drinking water. All foul places about the premises should be disinfected with chlorinated lime and left disinfected, especially during the epidemic. The milk and water should be thoroughly sterilized before using it during an epidemic.

THE GENERAL MANAGEMENT OF THE PATIENT AND DIETETICS.

The successful treatment of typhoid or enteric fever in childhood is largely dependent on the attention which is given to the general management and nursing of the patient. In the first place see that the patient is not exposed to any further action of the poison. If the original source of the infection is found upon inspection to be connected with faulty sanitary arrangements in the house or in the neighborhood, it may be necessary to remove the patient to more favorable surroundings.

In private practise among the well-to-do classes, children commonly come under observation during the prodromic period, or early in the first stage of the disease. If the fever has already declared itself, the use of the thermometer will put the physician upon his or her guard as to the nature of the sickness. If in cases seen during the period of prodromes the symptoms are such as to excite a suspicion as to the nature of the disease, the patient should be put in bed. Should the malady prove to be in fact a simple ailment, nothing is thus lost; if, on the other hand, the symptoms subsequently prove to have been those of the

forming stage of enteric fever, early rest in bed can not fail to influence favorably the subsequent course of the attack. The strict rules in regard to absolute rest in bed, and to the use of the bed-pan and urinal, which must be enforced in adults, can not be well carried out in cases of young children.

The room should be large and well ventilated; the temperature should range from 66 to 70 degrees Fahrenheit. It is desirable that the apartment should be heated by an open fireplace rather than by furnace heat. Thorough ventilation must be secured both day and night, and direct draughts are to be strictly avoided.

It must be impressed upon the attendant that fever patients are not likely to take cold. The bedcovering should be light; the body should be sponged twice a day with water containing aromatic vinegar or alcohol in small quantities. Among the minor duties of the nurse, which are not, however, of inferior importance, are the frequent changing of the position of the patient's body as will be restful to the little sufferer, moistening the child's mouth with cold water, cleansing the tongue, the prevention of the accumulation of sordes on the teeth and tongue, and most scrupulous care of the person in every respect.

If the evacuation of the urine and fæces in bed can not be prevented, the discharges and soiled clothing are to be changed without loss of time and immediately disinfected. In severe cases we may have to use two bed-pans, the patient being lifted from one to the other.

Fluid is to be administered freely. The best drink is pure water; partially peptonized milk, when not repugnant, is advantageous; buttermilk is especially serviceable; it may be diluted with one-fourth water where it is very thick. When, at the age of thirteen years, the writer had typhoid fever, she lived for over three weeks almost entirely on buttermilk partly diluted with water. The milk was fresh-churned daily. The koumiss matzoon for a portion of the milk is often relished by the patient. Raw eggs given in sherry or with milk in the form of eggnog, are often very well borne, and are very nutritious. The various animal broths may be used as adjuvants to milk, but are not to be relied upon as affording much nutrition; beef essence is more stimulating than nourishing. All meat essences should be freshly made. No artificial food should be allowed to remain in the sick-room.

A record should be kept in all cases of the quantity of food taken during the twenty-four hours, so the physician can judge exactly what has been taken. During the day, food should be given every two hours. In the night it is better to arouse the patient at intervals of every four hours. The skill of the physician comes in here—to judge whether it is better to arouse the patient from a semi-stupor and administer food to prevent exhaustion, or to let the patient sleep where there has been much insomnia or wild delirium. The physician should prepare a written schedule for the nurse, because so often in the country there are no trained nurses. With written directions the mother will be more accurate in carrying out the instructions given her as to the times

of feeding, administration of medicines, etc., and if this is so arranged that food is given at 10 P. M., 2. A. M., and 6 A. M., there will be very litle disturbance of the patient during the night. When the food and stimulants are given at these long intervals, they should be given in larger amounts; and if the exhaustion of the patient is severe, the intervals should never be longer than three hours during the night.

It is impossible to lay down with any accuracy rules as to the amount of food; the object is to get all the food possible digested, and put none in the alimentary canal which can not be digested. Most adult patients will take two quarts of milk, or milk food, as buttermilk or koumiss, with four eggs, in twenty-four hours. Some adults require much more, some less. Sick stomach, excessive tympanitis, excessive diarrhea, and above all the appearance of curds or other particles of undigested food in the stools, indicate that the patient is taking more food than can be digested. Under these circumstances, peptonized foods are especially valuable, and it may become necessary to withdraw the milk temporarily, and sustain the patient with animal broths. We have known milk and champagne to be taken by the stomach when it would retain no other food. Coffee, tea, and even cocoa are rarely in themselves harmful, and may sometimes be used with great advantage in adult cases for the purpose of getting a patient to take milk, when otherwise milk is repulsive to the palate. Cold water may be given freely, or cracked ice is preferable in case a patient is taking three quarts of liquid in twenty-four hours, as much water might upset the stomach with an excess of fluid. In most cases the various liquid foods given cold will be more grateful, especially in the hot season in the southern states, where typhoid fever is very common. It is rarely the case that the stomach will not tolerate cold foods.

Alcohol, according to our belief, should be used in some form in every case of typhoid fever from the beginning, unless there should be some strong moral reason for refusing it, as when there is a distinct heredity toward drunkenness. Given properly, it is incapable of harm. There are two distinct uses of alcohol in typhoid fever and other adynamic diseases. Early in the attack, given in small amounts with the food, it acts as a local stimulant to the digestive organs, which so much need it, and enables the patient to take more food than would be otherwise possible; while in the advanced stages of the disease it is useful as a general stimulant, and should be given freely, if necessary, with the food, and also at other times if indications call for it. In the first week of an ordinary case of typhoid fever a tablespoonful of whisky in a tumblerful of milk is a full dose for an adult, one ounce to two ounces of whisky being given in twenty-four hours; in the advanced stages ten or twelve ounces of whisky may be given in twenty-four hours if considered necessary. Beyond this amount it would not be advisable to give it. The physicians, of course, are guided by the effects as well as by the degree of existing exhaustion. So long as the pulse under the use of the spirits becomes slower and steadier, and the

tongue more moist, and the nervous symptoms less severe, so long it is probably doing good, and the patient should be gradually withdrawn from its use during convalescence. Whenever the patient flushes or becomes nervously excited after a single dose, or whenever the odor of the liquor appears on the breath, or the pulse takes on the peculiar angry feel which every experienced practitioner must know, too much of the spirits is being taken. Stimulants should be given at short intervals and in small quantities, usually every two hours during the day, every three or four hours during the night, the night portion being larger than the day allowance.

In children alcoholic stimulants are not so much needed in enteric fever. In the later stages the indications which call for their administration are twofold; first, great and general prostration, as manifested by weakness of the heart's action; secondly, a feeble or scarcely perceptible cardiac pulse and a correspondingly faint, almost inaudible, systolic sound, call for their administration; while such evidence of nervous prostration as marked delirium, stupor, tremor, subsultus tendium, and the like, are best combated by the use of stimulants. Alcohol is also indicated where the symptoms which attend extensive and deep intestinal ulceration, such as frequent diarrhea, tympany, and great tenderness, are marked. We can not lay down any set rule as to the amount for a child. It must be given according to the age of the child, and according to the child's general condition. It may be administered in milk, a half teaspoonful to a dessert-spoonful to a child five or ten years old, as required, at short intervals of every two or three hours during the day.

The most important part of the treatment of typhoid fever is that which relates to the reduction of the temperature. The external application of cold stands first; so soon as a patient reaches the temperature of 102 degrees Fahrenheit, he should be sponged freely with cold water. Antipyrine, phenacetine, and guaiacal act well in typhoid fever, but they may cause a collapse. Some writers think they are capable of doing harm in typhoid fever by disturbing the nutritive processes of the body; others think it remains a matter of pure conjecture. If used at all, they should be employed in small doses, simply for the purpose of hindering the rise of temperature in those cases in which the baths would otherwise have to be given at short intervals.

It is said that the extreme use of the cold will always reduce the mortality rate to three or four per cent. When the temperature reaches 102 degrees Fahrenheit, the patient must be freely sponged with cold water, the body being freely exposed to the air while the process is being carried on. If the temperature rises to 102.5 degrees Fahrenheit, the cold pack should be used. The naked body of the patient may be wrapped in a sheet wrung out of ice-water (if in the country where ice can not be obtained, cold well or spring water may be used), and placed on a rubber-covered cot or bed, and pieces of ice so placed that their outflow shall spread over the sheet and keep it cool. When a

fever patient is wrapped in a blanket, the pack soon becomes hot; however, in children it usually suffices. The external use of cold is so decisive that in private practise the physician should insist that every obstacle be surmounted. An easy method of using cold is that devised by Wood, M. D. An ordinary cot should be placed at the side of the bed, half open, and covered with a rubber sheet so arranged that the upper end of the sheet goes over the headboard, while the lower end forms a sort of trough at the foot of the cot, the head of which is slightly elevated. The patient, being wrapped in a wet sheet, can be readily slid from the bed to the cot, and then by means of a large sponge, the patient can be soused continuously with cold water, which lies about the patient, and, as it accumulates, runs off at the bottom of the cot into a tub. The rubber sheet can be placed under the patient in bed when there is no cot at hand; a trough can be made of it, and the patient soused with water as required. An ordinary sprinkler answers well when there is no large sponge at hand, which is often the case in the country.

The Cold Pack.—A blanket is spread evenly over a couch or bed; a coarse wet sheet may be laid smoothly over the blanket, folded once. The patient is now lifted onto the bed thus prepared, and quickly wrapped in the wet sheet, keeping the sheet smooth as possible over every part of the body except the head. If the extremities feel cold before the packing, they must be warmed by friction, or else the extremities below the thighs should not be included in the packing.

As soon as the child is wrapped up smoothly in the cold wet sheet, the nurse may fold the blanket over the patient in the same manner, first drawing over and tucking one side smoothly under, then the other side, seeing the chin is free, and that the blanket is folded evenly, but without tension at the neck. Finally, the long end is drawn down and folded smoothly under the feet. Three or four thicknesses of the wet sheet spread upon the blanket are necessary to reduce the temperature effectively. Repeated packings may be necessary to reduce the temperature; in such cases there may have to be two cots, or one cot and a bed, and the patient should be lifted from one to the other. When the temperature does not rise above normal, or when shivering takes place, the packing must not again be renewed.

During the packing the pulse is felt at the carotid artery, or temporal artery, and the temperature taken by the mouth.

The patient is allowed to remain in the last pack from half an hour to an hour; at the expiration of this time the skin generally becomes pleasantly warm, and in many cases outbreaks of perspiration take place.

The Cold or Gradually-Cooled Baths.—The gradually-cooled bath is generally employed. The quantity of water must be enough to immerse the body of the patient; the tub should be portable and stand at the bedside; and during the bath the skin should be gently rubbed. The temperature of the water should be about 100 degrees Fahrenheit, even higher than this at the first bath. As the patient becomes accus-

tomed to the bath, it is gradually cooled down by the addition of cold water to 80 degrees Fahrenheit or lower. Under no circumstances should it be cooled below 75 degrees Fahrenheit. The average duration of the bath is five minutes; but if shivering or great uneasiness should occur, the patient must be lifted into bed, placed upon a sheet previously made ready, and wiped dry, with brisk rubbing of the extremities and back; the moist sheet is then removed. The patient is covered up, and some hot soup, or wine, or brandy and water administered. The temperature is not always immediately reduced, but, as measured in the rectum, usually falls within an hour from 1½ to 4 degrees. In the course of some hours it rises again, and the bath is then repeated. If cold baths are not well borne, good results in lowering the temperature often follow prolonged lukewarm baths. Sometimes it becomes necessary to repeat the bath once in the course of twenty-four hours. A patient who is sleeping quietly, even though his temperature be high, should not be roused and immediately placed in the bath.

It must be remembered that when young children are treated by this method, the temperature of the bath at the beginning should be warm, and the blanket in which the little patient is gradually lowered into the water, spread over the bath-tub.

Not only is the child's temperature lowered by this means, but also a very favorable influence is exerted upon the state of the nervous system. The intellect clears up, the dulness diminishes.

Cold Affusion.—While the patient is in the tub, cold water 60 degrees Fahrenheit is thrown by means of a sponge over his head, face, neck, shoulders, and chest. This is repeated once or twice just before removing the patient from the bath. It is done more for the sake of the good effect upon the nervous system in cases of great stupor and evidences of serious nervous derangement, than merely as a means of reducing high temperature.

Ice-Water Enemata.—Rectal injection, carefully administered, is recommended for lowering the temperature. In enteric fever the quantity of cold water should not exceed three ounces.

The face and head of the patient must always be well bathed with cold water just before and during the application of cold to the general surface of the body. The occurrence of a chill or rigor may be delayed by more or less vigorous rubbing or chafing of the body.

The reduction of the temperature by one or two degrees often follows the administration of a tepid bath of 85 degrees to 95 degrees Fahrenheit of a duration of from five to ten minutes.

Contra-indications to the use of the bath are marked general debility, feebleness of the heart action, coolness of the surface and extremities, and intestinal hemorrhage.

Chest complications, even when severe, do not as a rule necessarily contra-indicate the very cautious employment of antipyretic treatment when the temperature becomes dangerously high.

Other complicated sequels are to be treated in accordance with general therapeutic indications, and are directed by the family physician.

The expectant treatment, in many of the milder cases, does well without any medication whatever. Rest in bed, careful nursing, and a well-regulated dietary, constitute all that is necessary for the proper management of the case. With moderate fever, absent or insignificant chest symptoms, a good heart, and little or no evidence of serious intestinal lesions, there is no need for the administration of much medicine. In such cases there is often a slight tendency to constipation. In all cases, at most, we may commence our treatment advantageously with a mild purgative dose of calomel; from one-tenth of a grain to one-twelfth of a grain, according to the age of the child, may be given every two hours until four doses have been administered (J. Wyeth's Triturates of Calomel and Bicarbonate of Soda from one-tenth to one-twelfth grain). If the bowels do not move in six or eight hours after the last dose has been administered, an enema of warm flaxseed tea, or of warm water with a little salt, or of warm water with castile soap-suds, may be used; from one-half to a pint of water is usually sufficient to move the bowels. We have had satisfactory results with a teaspoonful of glycerine in a teacup of warm water used as an enema to move the bowels. Also a ninety per cent glycerine suppository inserted into the rectum has acted promptly. These measures to secure action of the bowels do not require repetition oftener than once a week. The calomel, however, may be repeated from time to time until the end of the first or middle of the second week of the attack *only*.

The so-called rational plan of treatment, like the expectant plan, makes no attempt to shorten the duration of the attack, or to modify its course as determined by the intensity of the infection and the reaction of the organism to that infection. In the absence of serious symptoms or complications, it is practically the same as the expectant plan.

When there is persistent nausea or vomiting in typhoid fever, the diet should consist exclusively of two to three parts milk to one part of lime-water, or of milk and carbonic-acid water; and if these fail, animal broths may be given. In very severe cases no stronger food than wine whey, barley water, or beaten-up whites of eggs strained through thin muslin and mixed with double the amount of water (the whites of the eggs whipped only a little, so they will strain easily), may be borne, and sometimes it may be necessary to withdraw for a time all food by the mouth, the patient being sustained by thoroughly peptonized nutrient injections.

The drugs which are useful are cocaine (dose, from one-tenth to one-quarter of a grain for adults, for a child according to the age), which may be administered from ten to twenty minutes before food is given; bismuth, with one-twentieth of a grain of calomel or without

calomel, according to the individual case, given when the stomach is empty; and nitrate of silver (one-eighth of a grain to an adult). A sinapism or blister to the pit of the stomach is sometimes of great service in persistent nausea.

Unless the diarrhea amounts to more than three passages a day, is should rarely be interfered with. If the patient fails to have a loose stool every day, especially if there is a tendency to excessive tympanitis, sweet-oil may be given, or, what is better, sweet-oil in a little flaxseed tea, *small* but frequent injections, till the bowels move. For the control of excessive diarrhea, paregoric and subnitrate of bismuth or opium suppositories may be employed. The following mixture is especially valuable:—

℞: Bismuth subcarbonitis.....ʒiij
Acidi carbolici.....gr. x
Camph. tr. opii.....ʒiij
Mucil acaciæ ad.....ʒvi

Misce. Shake thoroughly; give a half-teaspoonful to a child ten years old every two or three hours, and smaller doses for younger children.

Logwood mixtures are sometimes of service:—

℞: Acidi sulpurici aromatici.....fʒij
Ext. hæmatoxyli .....ʒiii
Syr. zingiberis.....fʒiss
Misce et adde.
Tr. opii camphorated.....fiss
Sig. Dessert-spoonful in water, to a teaspoonful according to the age.

When the stools are large and very thin, bismuth subnitrate may be given freely in large doses (gr. v–xx) every four or six hours. If necessary, may add to this opium in doses proportionate to the age of the patient (gr. $\frac{1}{160}$–$\frac{1}{40}$, or Dover's powder gr. $\frac{1}{24}$–$\frac{1}{2}$. Equally satisfactory is the combination of minute doses of calomel (gr. $\frac{1}{24}$–$\frac{1}{16}$) with Dover's powder in doses suitable to the age of the patient.

The oil of turpentine, administered in linseed oil by the rectum, is effective for the treatment of the intestinal ulceration. It should be given by the mouth in capsules or in starch emulsion; the dose for an adult of the oil of turpentine is from five to ten minims. If it be given in starch, a fresh amount should be prepared every morning. Give the remedy three times in twenty-four hours. The writer usually gives from three to five minims in one tablespoonful of starch emulsion to a child from five to ten years of age, between regular meal-times, three times in twenty-four hours. A flannel cloth large enough

to cover the abdomen is dipped in the oil of turpentine, and laid over the bowels, and over this a piece of oil silk, confined with a light bandage. To administer the turpentine per rectum when it disagrees with the stomach, the bowels are first moved off with warm flaxseed tea with a little glycerine added; then a soft rubber tube is passed up through the rectum about six inches or more, and about one tablespoonful of linseed oil is administered, well mixed with ten to twenty drops of the oil of turpentine. Always have a sufficient quantity to allow of a little being left in the tube, which has been attached to a fountain or a cylinder syringe. This may be repeated three times in twenty-four hours; and when carefully administered, it is a harmless remedy. Peyer's patch will heal from the administration when other remedies fail. Thymol is highly recommended in doses of from two to five grains for adults, less for children; this is a substitute for turpentine. Some physicians recommend solol, iodine, and chlorine for the purpose of destroying the typhoid bacillus; but by other physicians it is said that there is no sufficient reason for believing that the course of typhoid fever can be modified by any of these agents, though some of them may act favorably by their local effect upon the alimentary canal. In choosing a remedy the physician should see that the drug is incapable of doing any harm.

In all cases of abdominal symptoms and tympany counter-irritation over the whole surface of the abdomen is recommended. Spices, plaster, or hot cloth wrung out of spice water may be used; but no doubt the turpentine stupes following warm fomentations of the bowels is the best counter-irritant. The fomentation may be given by means of a hot flannel wrung out and laid over the bowels for half an hour; then put on the turpentine stupe, as already directed.

When intestinal hemorrhage occurs, opium should be freely used for an adult (less for children), to secure quiet and prevent alarm. Absolute rest must be enjoined, and in severe cases the patient should not be disturbed with the bed-pan, but slip a piece of oilcloth, or, better still, a rubber sheet, underneath the water, and let the dejecta pass into a sheet which has been placed over the rubber cloth. In all cases a folded sheet, called a "draw-cloth," should be kept smoothly under the patient for the purpose of easy handling by rolling the patient a little, so that the genitals can be easily cleansed. Ice-bag filled with ice, wrapped with a flannel, should be applied over the surface of the abdomen, and the food should be restricted with severity proportionate to the gravity of the hemorrhage. In bad cases whites of eggs strained and animal broth or essences should alone be given. The best styptic, according to Wood's experience, is Monsel's salts (not solution), which should be given in double capsules in doses of one-half to one grain, at intervals of from one to four hours. Tannic acid is used by some physicians. Oil of erigeron, in doses of fifteen to twenty drops every two or three hours, it is said, may sometimes be advantageously substituted. Extract of ergot (ten grains in capsules) may

be of great service, alternated with Monsel's salts in such a way that the patient gets one dose every two or three hours. In sudden bad cases of hemorrhage extract of ergot may be given hypodermically.

Collapse occurring from intestinal hemorrhage is met with the usual remedies and transfusion, or the normal saline solution (one-half per cent) may be injected slowly into a vein or buttock, the greatest care being exercised to see that the injected liquid and the apparatus used have been absolutely sterilized by heat. A large quantity of the solution can thus be absorbed. Usually one pint or more is used at a time. Moreover, the injections (Venus) can be repeated until the result is secured. Before injecting the salt solution, the part is to be washed with carbolized solution, then the parts sprayed with ethyl chloride Bengue to deaden the skin, so that the passing of the instrument will not give any pain.

Peritonitis in typhoid fever is usually caused from perforation, and ends fatally when not localized in the neighborhood of the appendix. The best treatment is in the use of opium up to continuous mild narcotism and in abstinence from food. When perforation can be diagnosed, laparotomy is recommended. Cases do occasionally recover from perforation without surgical aid. In 1891, Fitz collected twenty-seven recorded cases of recovery from peritonitis, three after operation, seventen after resolution, and nine after the spontaneous discharge of pus. According to Osler, the corrected statistics up to 1895, excluding doubtful cases, were twenty-four laparotomies with six recoveries.

When headache in typhoid fever is severe enough to require treatment, phenacetine or antipyrine may be used very carefully, in doses moderate for adults, very small for children. Under no circumstances should they be actually pushed. A cold cloth wrung out and laid over the forehead often relieves headache. It is better to rely on opium for the relief of the pain in the head, if it be otherwise uncontrollable. Should there be an epileptiform convulsion, a blister may be applied over the back of the neck, or on the back of the scalp after shearing it. The blister should not be allowed to remain on more than half an hour. The parts may be dressed with a corn-starch poultice with plenty of sweet-oil spread over the poultice. Keep the poultice thus applied till the blister heals. Two poultices a day are sufficient to keep the patient comfortable. Remember that old linen cloth or an old handkerchief, etc., is best to use for the poultice. For the relief of insomnia, opium, trional, or sulphonal may be employed. Chloral acts most admirably when there is no exhaustion, but it has to be given with great caution. In the excessive adynamia of typhoid fever, strychnine (one-thirtieth to one-fiftieth of a grain) proportionate to the age of the patient is a most useful remedy. In severe cases it should be given hypodermically at intervals of four hours, or, better, alternately with cocaine (one-sixth to one-third of a grain) at intervals of six hours (three hours between doses), according to the age

of the patient. Digitalis and strophanthus are sometimes useful for sustaining the heart.

In the crisis of typhoid fever, when failure of vital power shows itself in simple collapse, in a furious delirium, in a high temperature which can not be controlled except for the moment by the application of colds, or in case of coma vigil, musk is said to be a valuable remedy. It should be given by the rectum in doses of fifteen grains every four or six hours, in two ounces of starch water with a little laudanum. Of course children require less amount of musk, but given in the same manner.

Pulmonic congestion in typhoid fever calls for further stimulation of the circulation, as it is largely due to cardiac and vasomotor weakness; alcohol, strychnine, cocaine, and digitalis should be given alternately or in combination. Large doses of ergot extract (ten grains given every two or three hours for adults) may be used for vasomotor stimulation, while oil of turpentine or of eucalyptus and terebene are the best expectorants. Turpentine stupes should be freely used.

THE MANAGEMENT OF THE PATIENT DURING CONVALESCENCE.

During the early days of convalescence the temperature remains labile, and abrupt recrudescences of the fever are apt to arise from very slight causes. It is therefore important that the patient be cared for assiduously for some time after convalescence is complete. For at least one or two weeks the temperature should be taken morning and evening, and during this time the diet is to be restricted to milk, soft-boiled eggs (better taken raw), custard, animal broths, or chicken jellies, and the lighter farinaceous foods. At the end of a week an adult may take wholesome, easily-digested solid food, including meat, *but not fried;* but the effect of such changes of diet upon the temperature and general condition of the patient is to be carefully watched. Quinine, iron, and cod-liver oil may be administered, if convalescence be tardy and anæmia persists.

CHAPTER XXIX.

TYPHUS FEVER.

Definition.—Typhus fever is an acute, contagious febrile disease, characterized by an eruption on the skin of ill-defined, brownish-red spots, great prostration, high fever, and profound nervous disturbances. The eruption usually appears from the third to the fifth day, and often becomes petechial.

History.—On this point there is very little to be said. The disease is not mentioned by any physician of ancient times; but it has been asserted that the great plague of Athens was typhus. It was first clearly described by Fracastorius in the fifteenth century; but from this time on it was confounded with other diseases until, about 1846, Jenner showed it to be quite distinct from enteric fever, and consequently from everything else. The last great epidemic of typhus was that which affected the French troops during the Crimean War.

Etiology.—Typhus does not arise primarily among children, but when it appears among adults, children of all ages take it. Its cause is unknown. It has been confidently asserted that it arises from destitution, overcrowding, and unsanitary conditions. It is endemic in Ireland, Bohemia, the valley of the Danube, and certain other portions of the world. It has been closely connected with famine, overcrowding, and the miseries of extreme poverty; and it has especially abounded in jails, in immigrant ships, and during sieges; hence the names *prison-fever, ship-fever, camp-fever.* It is extremely contagious, the danger increasing enormously when cases are collected in hospitals, under which circumstances the nurses and medical attendants are liable to suffer. It may be communicated through the wearing apparel, the bedclothing, etc., and persons not suffering themselves may become sources of infection. Epidemics may also arise from bales of rags or other similar material which has been gathered in affected districts. It is thought probable that the poison escapes from the body through all possible avenues, although on this point there is little definite knowledge.

Epidemics are more common and more severe in winter than in summer, due, in all probability, to the overcrowding and lack of ventilation which prevail in cold weather. A patient suffering from this disease should be isolated from the rest of the family and abundantly supplied with fresh air, while the utmost precaution should be taken in the disinfecting of the discharges, of bed linen, and of the clothing, the same as has been advised in typhoid cases. (See Typhoid Fever.)

It is said that the contagion does not extend far beyond the patient, and therefore, *with due regard to cubic space and ventilation,* others can be protected by isolation; but when they are "pent up" and about, they run the risk of contracting the disease by direct communication with the typhus cases.

Symptoms.—These in children are not usually well marked, although cases are reported presenting all the severity so common among adults.

The period of incubation of typhus fever is usually put down as twelve days, but it may be much longer or much shorter. During this stage the symptoms are very slight. The disease in most cases is said to commence suddenly with a chill, followed by an immediate rise of temperature, which may reach 105 degrees or 106 degrees Fahrenheit on the second day. During the next ten or twelve days there is no remission of the fever, but the evening temperatures are from two to four degrees higher than those of the morning. At the end of the tenth or twelfth day the temperature usually falls, not with the absolute abruptness of a pneumonic crisis, but in the course of two or three days. In fatal cases it is common for death to be preceded by a sudden rise of temperature to a great height, even 108 degrees Fahrenheit.

The general symptoms of typhus fever develop almost as rapidly as the fever; the pulse is full and quick but soft, and only in rare instances dicrotic; from the first the pulse lessens in power more and more as the disease progresses. The typhus face, even in the earliest stage, is characterized by the dark reddish, almost cyanotic tint, not only of the face itself, but also of the conjunctiva, and by its heavy, stuporous expression. The tongue, which is whitish and moist, soon becomes dark, and assumes a brownish color, corresponding with the ever-increasing sordes about the teeth.

A peculiar odor resembling somewhat that of putrefaction, is given forth from the skin, with the breath, or with excretions. The violent headache, and the atrocious pains in the back and in the limbs, which mark the outset of the disease, may continue until they are lost in a stupor, which is commonly broken by a low, muttering delirium.

The mental state varies greatly in different cases, or sometimes from day to day in a single case.

A wild, raging mania may break forth; or an hallucinatory delirium, with a never-ending, rapid succession of visions, with extreme agitation and emotional excitement, may closely simulate delirium tremens and give rise to attempts at escape, to assaults upon the nurse or care-takers, who are mistaken for tormenting demons, and even to suicide as a means of escape from haunting melancholia. Hours will be spent in a wild harangue to an imaginary audience upon a religious or other topic. Usually on the third or fourth day, although sometimes delayed until the eighth day, the eruption appears upon the front of the chest and abdomen, and rapidly spreads, so that in two or three days it covers the whole body. As the disease progresses, the

rash becomes more and more distinctly hemorrhagic, until it takes the form of small, irregular, petechial patches.

During the second week of the disease there are extreme prostration, a rapid and feeble pulse, subsultus tendinum, carphologia, or picking of the bedclothes, and, it may be, a tendency to sloughing of the buttock, heels, and other parts of the body exposed to pressure. Almost invariably bronchial irritation and pulmonic congestion are present in the beginning of a typhus fever, and not rarely they increase until they become a serious element of danger.

Pronounced abdominal symptoms are rare in typhus fever, and when they do occur are to be looked upon rather as accidental than as characteristic. The anorexia is complete, but not active disgust for food. There is no meteorism and no abdominal tenderness; ordinarily the bowels are constipated, the stools being normal in color and consistency. There are reported cases of diarrhea occurring occasionally. If perchance the stools are liquid, they are usually dark-greenish, never being of the yellow-ochre color of the typhoid stool. The spleen may or may not be enlarged. The urine is scanty, and may in somewhat exceptional cases be albuminous, but nephritis is rare. There is the usual febrile increase of urea and uric acid, with lessening of the chlorides.

Typhus fever is a disease much more uniform and self-consistent in its course than is typhoid fever, varying chiefly in intensity. It may be so slight that diagnosis is uncertain; it may be so malignant that the patient dies in profound exhaustion as early as the second or third day, covered with petechiæ from blood destruction.

The convalescence from typhus fever is usually rapid and free from complications, though it may be interrupted by septic purulent inflammations, such as parotitis and abscesses.

Diagnosis.—In children it should be remembered that although they contract typhus fever, it is not usually found among them except in association with adults; so that when a case is met with in a child, a well-marked case or cases will probably be found among its adult relations or neighbors. It should also be remembered that typhus fever is usually epidemic, either in the district, the town, the village, the street, or the house; so that if one case is found, there will probably be others not far off. The diseases with which it is most frequently confounded in the case of adults are pneumonia and chronic kidney trouble. The eruption of the typhus is the most characteristic symptom, but it is unfortunate for the purpose of diagnosis in children that it is rarely well marked. In the case of these, therefore, help must be looked for in the general surroundings of the patient. The history of the case should be carefully considered, and the presence of other cases in the family or neighborhood should be inquired after.

Next in importance to these considerations is the general aspect of the child. The expression is dull and heavy, the eyes have an injected appearance, and generally it is somewhat drowsy. With these

symptoms there are no local changes to account for the ill-defined fever in the case of a child whose adult relations or immediate neighbors were or had been affected by typhus symptoms or physical signs,—no chest or abdominal symptoms, no acute pains in the head, as in meningitis, even though it complains of headache. If with these symptoms there is faint mottling of the skin, particularly of the wrist and subclavicular regions (care having been taken to eliminate "flea bites"), there can be but little doubt that the disease is typhus. The diagnosis may be made from attention to the following considerations. In pure hemorrhagic smallpox the spots are very large, often like spots which may be made by throwing ink from a pen on white blotting-paper, and they exist in large numbers closely packed over the lower abdomen; in typhus they are minute, about one-sixteenth to one-twelfth of an inch in diameter, and they are distributed all over the body.

In hemorrhagic smallpox, the petechial and purpuric spots are almost invariably accompanied by blood-clots in the conjunctivæ, and sometimes by large patches exactly like the bruises produced by blows; in typhus fever there is nothing of the kind. In hemorrhagic smallpox the eruption is accompanied by hemorrhage from one or all, usually several, of the mucous surfaces; in typhus there is nothing like this. In hemorrhagic smallpox these eruptions are well out on the third or at least on the fourth day; in typhus, the eruption does not, as a rule, begin to come out until about the fifth day, and is not well out till about the seventh day, and does not become petechial till about the tenth day, and in children it is rarely petechial because of the mildness of the disease and of the occurrence of the crisis at or before that day.

Measles might in some cases give rise to difficulty, for in these the eye is suffused and injected, and the expression drowsy; but the eruption is most abundant and most marked on the face, whereas in typhus, the eruption is rarely on the face, and when it is, it is but slightly marked and never characteristic.

Unfavorable signs are extensive congestion and inflammation of the lungs, bronchitis, pleurisy, nephritis, laryngitis, and diphtheria; but in children under ten these complications are very rare.

Treatment.—There is no specific treatment of typhus fever. The management of the case is about the same in principle as that which has been discussed in typhoid fever. Typhus fever, for the most part, is so mild in children that active treatment is rarely required. The patient should have good nursing and a well-ventilated room, the temperature of which should be kept about 50 degrees Fahrenheit during the acute stage. The child should be fed upon milk, beef tea, chicken broth, bread steeped in the beef tea, and raw eggs, of which he should have as much as he chooses to take. The mouth should be kept scrupulously clean by washing with a soft tooth-brush or a soft mop as often as may be necessary. Give the patient all the cold

water that is desired; ice-water is very agreeable. A tepid bath should be given daily, and the clothing changed, also the bed linen. No drug beyond a dose of castor-oil will be required.

Giving medicine so as to cause the patient as little disgust as possible is no slight art, and one that it is worth any trouble to gain. In the first place, the glass or vessel in which it is given must be thoroughly clean, not having been used to give a previous dose, and remaining unwashed, as is so often the case. Never pour the medicine out in sight of the patient if it is in the least disagreeable to him; and if the child is to take anything after the medicine, give it instantly after the medicine, so that the taste of medicine will not last long, and thus prevent disgust as far as possible. Castor-oil should be given warm; put orange juice in the glass first, then the oil, then more orange juice. The patient must be encouraged to open his mouth and take it boldly, then let him take a little piece of orange, and suck it till the taste of the oil has disappeared. It may be given in diluted brandy or lemon juice in a similar manner. Bed-sores must be guarded against by keeping the sheets and clothing smooth. Wrinkled clothing will provoke bed-sores. To avoid this, some spirit lotion should be employed and a water-bed supplied. When there is much restlessness, sponging with cold water will be found very quieting. To favor sleep, the patient should be kept quiet; and if necessary to procure it by artificial means, a warm bath followed by a dose of port wine may be given, and generally opium should be avoided. The bladder should be examined, as retention might arise. When the temperature has fallen, the child may return at once to his ordinary diet. Antipyretics, such as the cold bath, quinine, antipyrine, and antifebrine, will rarely be required in the case of children, because of the mildness of the disease. In adults more active measures are required from the very beginning than are called for in children.

CHAPTER XXX.

RELAPSING FEVER.

Definition.—This is a contagious febrile disease, produced by the presence in the blood of the spirillum (spirochæta) of Obermeier, and characterized by a succession of febrile paroxysms and remissions, each of about six days' duration and recurring from two to four times.

Etiology.—The immediate cause of relapsing fever appears to be the spirillum which was discovered in 1873 by Obermeier. The contagion is capable of producing the disorder without any predisposing causes. The contagium may be communicated directly from person to person or may be carried in various fomites or in anything containing heat, as in woolen goods, feathers, etc. It seems to be rather less acute and enduring than the contagia of typhus and scarlet fever. Neither age, nor sex, nor race, nor season has distinct etiological influence. In India relapsing fever seems to be almost endemic, according to statistics.

Morbid Anatomy.—Hyperplasia of the bone-marrow and of the spleen, with cloudy swelling in the liver, kidneys, and heart, granular degeneration, with the presence of infarction in the various organs, are lesions which have been noted after death from relapsing fever; but they can not be considered especially characteristic in any way.

Symptomatology.—Relapsing fever is a disease which affects both sexes and all ages, except, perhaps, that the infant under one year of age is rarely affected with it.

The period of incubation is usually from five to eight days, but in some cases it has appeared to be only about twenty hours. The attack begins abruptly, with a chill, general aching pains, often with vomiting and vertigo, and sometimes with convulsions. In children, however, as a rule the symptoms are less marked, and not infrequently the disease is of the abortive type; that is, there exists a tendency to run a shorter and milder course than in adults. When an abrupt chill or rigor comes on, the temperature may run up to 105 degrees to 106 degrees Fahrenheit, with a quick, rapid pulse, sharp pain in the head, darting pains in the limbs and loins, no desire for food, and great thirst; there is vomiting and anorexia. In severe cases there is violent headache, insomnia, and in some cases delirium. The enlargement of the spleen is rapid and often great; the liver is similarly affected, but not to so great an extent.

Typical cases are steadily maintained until the fifth or sixth day, when there is an abrupt defervescence, accompanied by a profuse sweating, or sometimes diarrhea. This crisis is sometimes deferred for ten or more days, and sometimes develops as early as the third day. In persons of feeble constitution, subnormal temperature

and collapse are not rare. Convalescence is immediate, the patient getting up at once. On the fourteenth day there is a return of the chill, with abrupt fever and other phenomena of the paroxysm. The second paroxysm is, as a rule, shorter than the first, and by a series of relapses the patient may be left profoundly exhausted. We often see jaundice, epistaxis, hypostatic congestion of the lungs, nephritis, acute enlargement of the spleen, sometimes ending in abscess.

Diagnosis.—The principal points in the diagnosis of the disease are: First, the spirillum, which is to be found in the blood by microscopic examination, provided Obermeier and others are correct. Second, the abrupt and rapid rise of temperature. Within twenty-four hours the temperature reaches 103 degrees to 105 degrees and even 106 degrees Fahrenheit in severe cases. On the fifth or seventh day it falls precipitately to a subnormal point, where it remains until about the fourteenth day, when it abruptly rises again, which is the commencement of the paroxysm.

Differential Diagnosis, from the Eruptive Fever.—There are no specific eruptions in relapsing fever and no abdominal symptoms such as are found in typhoid fever; *from typhus fever* it is distinguished by muscular pains, the remarkable enlargement of the spleen, and the peculiar temperature.

Prognosis.—In youth, relapsing fever, like typhus, is generally of a mild type; hence the prognosis is more favorable than in adult cases.

Treatment.—There is no known way of aborting a paroxysm of relapsing fever or of preventing its recurrence. Quinine does not have any special influence. A plentiful supply of air should be in the room, but no draught should be allowed; otherwise there may be danger of pneumonia and other complications as the result of exposure.

Absolute cleanliness of the room and the patient should be looked to. Isolation of the patient and rigid disinfection of the clothing are necessary to prevent the spread of the disease. The patient must be confined in bed, not only during the paroxysm, but especially during the intermission, and be freely fed with milk broths and other light food; but the stomach should not be overloaded or crowded.

The body of the patient should be washed with some disinfecting solution. Take carbolic acid one drachm to a pint of water; wash the patient first with warm water with soda bicarbonate rubbed all over the body, then rinsed off; then sponge with carbolized water. This renders inert the poisonous exhalations from the body. Good, old-fashioned lye soap to cleanse the body with is very effective. The bed-clothing as well as the patient's clothing should be changed daily and boiled when washed. (See Typhoid Fever, Asepsis of.)

Early in the disease, as is agreed among authors, very little medicine is required. A laxative may be administered, or an alterative and laxative combined, as hydrarg-chloridum mite et sodae (1 to 2 grains for an adult), followed in eight hours with a saline laxative, such as

Epsom or Rochelle salts. Where vomiting is present, small doses of calomel and opium combined will generally allay it, or the following mixture has proved beneficial in the writer's hands:—

℞: Iodine ..... gr. xv
Acid carbolic ..... gr. viii
Aquæ menth pip
Mucil aciæ, aa ..... ℥j

M. et sig.: For adults. Put fifteen drops in three tablespoonfuls of ice-water; give of this a teaspoonful every fifteen minutes or every half hour, until vomiting is controlled.

For headache, apply an ice-cold cloth to the head, or an ice-bag or bladder. At times a hot mustard foot-bath gives relief. Leeching and dry cupping are often of great service. For pains in the back, opium, administered hypodermically or by the mouth, should be used *pro re nata*. Salicylates are said to be injurious. Chloral, administered with one or more heart tonics for sleeplessness, is considered the most efficient, but it must be used with great care. Digitalis, strophanthus, fluid extract of cactus grandiflora, citrate of caffeine or caffeine—either of these that is suitable to the general condition of the patient may be given with the chloral. Alcohol and other stimulants are to be freely given when there is much prostration. The hyperthermia is best met with cold baths. Turpentine stupes, stimulating frictions, and dry cupping over heart and lungs are recommended. All depressing medicines should be avoided.

Jaundice should be treated by the milder remedies usually employed in catarrhal jaundice; the phosphate and sulphate of sodium take precedence among the remedies for jaundice in children. Harley has extolled the virtues of Glauber's salt, sulphate sodium. These salts may be given together, and seem to be more efficient combined than when given separately.

Muscular pain is relieved considerably by chloroform liniment:—

℞: Chloroform ..... ℥ij
Oil peppermint ..... ℥ij
Oil sassafras ..... ℥jss
Tr. arnica ..... ℥iv
Spt. etherii nit., ad ..... ℥viii

M. et sig. (Liniment.)

Apply when necessary, or twice or three times in twenty-four hours, rubbing thoroughly over seat of pain.

During convalescence, caution and rest must be enjoined to avoid heart failure.

The treatment for the convalescent stage consists in rest, tonics, such as cinchona, iron, and malt extract, and alcoholics if required. Later on, a change of air and surroundings may be advantageous.

Pneumonia, should it exist, may be treated the same as typhoid pneumonia.

Abscesses should be treated on general principles.

CHAPTER XXXI.

CEREBRO-SPINAL MENINGITIS (SPOTTED FEVER).

Definition.—This is a febrile disorder, "probably a microbic disease," occurring in widespread local epidemics. It is chiefly manifested by the occurrence of cerebro-spinal meningitis. The prominent symptoms are such as meningitis gives rise to, namely, fever, headache, tonic contraction of the muscles of the neck, spine, hyperæsthesia, and neuralgic pains in the trunks and extremities. It is non-contagious, or, if contagious, it is thought to be to a very low degree; and, like most of the microbic diseases, its victims are chiefly the young. It begins abruptly or without a premonitory stage, and is often speedily fatal from intense hyperæmia of the nerve centers, or the severity of the cerebro-spinal meningitis. In other cases, after weeks or months of suffering and progressive loss of flesh and strength, death occurs in a state of extreme prostration; and in those who recover, convalescence is protracted and slow.

Etiology.—It is thought that the disease may be produced by a micro-organism. This is generally believed; but it is one of the most mysterious diseases. Its origin has not been traced to overcrowding, or to the accumulation of filth, or to any ordinary causes of febrile disease. Some writers, however, claim that it might be favored by overcrowding of individuals, so that it is especially prone to appear amid the misery and poverty of large tenement houses in cities, and it is said that it has been severe among soldiers in garrison towns. It does not spread from one person to another, and the attendants upon the sick are very rarely affected. It is not known to be carried in fomites. Long-continued, excessive labor, whether mental or bodily, seems to predispose to the attacks.

Dr. A. Frankel and other European microscopists have carefully examined the bacteria found in the blood and tissues of those affected by it. At a meeting of the Berlin Medical Society, held February 12, 1885, Herr Leyden showed under a microscope specimens of micrococci found in a case of cerebro-spinal fever. Dr. V. O. Pushkareff, connected with one of the barrack infirmaries of St. Petersburg, stated that in five cases of croupous pneumonia in which cerebro-spinal meningitis occurred as a complication, he discovered in the pus taken from the cerebral meninges swarms of micrococci, whose appearance under the microscope seemed identical with that of Friedlander's pneumococcus.[1] They were either isolated or in groups of two, seldom four,

[1]Deutsch. Med. Wochenscher, April 4, 1883.

having distinct capsules, and they were absent from the fluid taken from the meninges in simple pneumonia. Pushkareff was able to cultivate the micrococcus taken from meningeal pus, and the cultivated microbes, like their parents, presented an appearance identical with that of the pneumococcus.[1] Moreover, Ebertho, in a case of meningitis following pneumonia, believes that he found the same micrococcus in the lungs and in the liquid taken from the inflamed pia mater. Frankell also states that he obtained from the purulent exudation in the pia mater, in a case of meningitis occurring with pneumonia, a microbe resembling that in the pneumonic exudation.[2]

The winter season is the most predisposing time of the year for the occurrence of cerebro-spinal fever. Statistics collected in Europe and the United States show that while one hundred and sixty-six epidemics occurred in the six months commencing with December, there were only fifty in the remaining six months of the year. In New York City, where the state of the domiciles is about the same the year around, the season appears to exert little influence on the prevalence of the disease.

Morbid Anatomy.—"In the apoplectiform cases ending fatally within twenty-four hours, there may be little or no visible alteration of the meninges; but the brain is swollen, its convolutions are flattened, and the furrows obliterated. The characteristic appearances are to be seen toward the second half of the first week and later. They consist essentially in the manifestation of an acute leptomeningitis, serous, fibrino-serous, or purulent. The dura mater is tense, its free surface normal. The outer surface of the pia mater is also usually unaltered. The meshes, however, are infiltrated with more or less opaque yellow, serous, fibrinous, or purulent exudation, which often varies in character in different parts of the brain in the same case. The inflammatory exudation is generally most abundant at the base of the brain and over the convexities. In the former region it fills the space between the optic chiasm and the pons, and is abundant over the cerebral peduncles and on the upper surface of the cerebellum. Similar appearances are to be seen in the pia mater of the spinal cord, either throughout or over limited portions. The infiltration is usually more extreme on the posterior surface of the cord and in the most dependent portions, especially in the lumbar region.

"The brain is pale, the convolutions are flattened, and the ventricles are distended with an opaque fluid from which yellow, viscid clots settle at the lowermost parts. The ependyma is swollen, soft, perhaps ecchymosed. If the patient dies during the later stages of the disease, the pia mater is thickened and opaque in patches and spots

[1]Ejen Klin. Gazeta, April 21, 1885.

[2]Deutsch. Med. Wochenscher, November 13, 1886.

and adherent in places to the brain. The convolutions of the brain may be atrophied and the meshes of the pia mater œdematous.

"There are splenic hyperplasia and grandular degeneration of the heart, liver, and kidneys. Bronchial catarrh is frequent, and atelectasis and hypostatic and lobular pneumonias are associated with the disease. The appearances characteristic of arthritis, endocarditis, pleurisy, nephritis, and enteritis are present when these affections complicate the course of the disease." (Wood.)

Symptoms.—During the prevalence of cerebro-spinal fever, cases now and then occur in which the symptoms are mild and transient, and the health is soon restored. Occasionally, also, are reported cases met with during the progress of an epidemic which present more or fewer of the characteristic symptoms, but in so mild a form that the patients are never seriously sick, and never entirely lose their appetite; but the disease, instead of aborting, continues about the usual time. The course and symptoms of cerebro-spinal meningitis vary so greatly as almost to baffle concise description.

The Mode of Commencement in an Ordinary Type.—It has been observed that cerebro-spinal fever rarely begins in the forenoon after a night of quiet and sound sleep. In seventy-two recorded cases by Louis, M. D., in the thirty-six severe and fatal cases the commencement was almost without an exception between midday and midnight. In young children convulsions in place of a chill may usher in the attack, or occur immediately after it; they may be partial or general, slight or severe. Stupor more or less profound, or less frequently delirium, succeeds. Mild cases more frequently than severe ones begin gradually, and with certain premonitions. The ordinary mode of commencement is, the patient is seized with vomiting, headache, and perhaps a chill or chilliness, which is especially common in adults, and the temperature rises to 101 or 102 degrees Fahrenheit. The pulse is slow, full, and strong; the face is livid, or perhaps pale, with an expression of great anxiety. As time passes, the headache increases in severity, and there is violent backache, a contraction of the muscles of the neck, and marked pain where the head is bent or flexed. The nervous disturbances grow more and more decided, until the muscles of the back are rigidly contracted, as in tetanus, or trismus, and neuralgia is not uncommon. In the graver cases semi-coma occurs within the first few hours, in which patients are with difficulty aroused, or profound coma, which, in spite of prompt and appropriate treatment, is speedily fatal. The pain frequently shifts from one part to another. The pupils are dilated, or less frequently contracted, and they respond feebly or not at all to the light if the attack is severe and dangerous; they will often oscillate, and occasionally one is larger than the other. Delirium may follow immediately after the chill, and is almost invariably an early symptom. It may be wandering, but is often furious and maniacal. Sometimes there is an increasing stupor instead of delirium.

The severe tinuitus aurium may be an easy symptom, showing that the special senses are affected; in the advanced stages of the disease deafness is almost universal. Double vision is an ordinary result of strabismus. A failure of the eyesight frequently marks the excessive pressure at the base of the brain. Skin eruptions are characteristic of the disease. Herpes labialis is very frequent and persistent, but the pathogenic eruption is that of petechiæ, which covers the whole surface of the body, beginning as small, bright, deep-rose, or purplish spots, or occurring in patches of various sizes, and in severe cases coalescing into great blotches over the body; this eruption may develop as early as the third day, or it may be postponed as late as the eighth day. In some epidemics it is a marked feature, and in others it is almost altogether absent. In some epidemics we see it has been replaced or accompanied by urticaria, rubeoloid rashes.

Louis, M. D., states that the highest temperature which he had observed was 107 $\frac{2}{5}$ degrees Fahrenheit, in a child aged two years. This was in the commencement of the attack. Subsequently it fell a little, but rose again the third day to 107 degrees Fahrenheit, when she died. In two other cases the temperature was 106 degrees Fahrenheit on the first day, and it did not afterward reach so high an elevation. One of these cases resulted in death on the ninth day, and the other in the ninth week. Wunderlich has recorded a temperature of 110 degrees Fahrenheit in two cases, with, of course, an unfavorable ending.

The following is a common example of the sudden thermometric changes observed in children of two years of age: "The temperature varied from 101 to 104 $\frac{4}{5}$ degrees Fahrenheit as the extreme, while that of the fingers and hands at the first examination was 90$\frac{1}{2}$ degrees Fahrenheit, at the second examination 90 degrees Fahrenheit, at the third 103 degrees, and at the fourth 83 degrees. Hence, at the third examination the temperature of the extremities had risen 13 degrees Fahrenheit, so as nearly to equal that of the blood, and at the fourth examination it had fallen 20 degrees Fahrenheit. The patient recovered."

The great and sudden variations in the pulse and the internal and external temperature have considerable diagnostic value in obscure and doubtful cases.

The average temperature of cerebro-spinal meningitis is distinctly lower than that of most of the serious continued fevers. It is usually below 100 degrees Fahrenheit; rarely does it reach above 103 degrees Fahrenheit, but fatal cases run high.

The difference between the morning and the evening temperature may be very great, but it may be wanting. Sometimes the maximum temperature occurs in the morning; the only characteristic features of the temperature curve are its great irregularity and the failure to follow any definite course.

There are two chief varieties of malignant epidemic meningitis: In the apoplectic or cerebral type the symptoms are violent headache,

rapidly-developed delirium with or without retraction of the head, great vital depression, moderate elevation of temperature, and a feeble pulse, which may be slow or rapid. Death in coma may occur in six or eight hours. In the second type there is vital depression, with clearness of intellect, moderate or high temperature, and the almost immediate appearance of ecchymoses on various parts of the body, which spread rapidly and involve the whole surface in dark purple spots; death occurs within twenty-four hours.

Anomalous forms of cerebro-spinal meningitis are recorded and described by Fitz. One is that which is sometimes known as the intermittent type, in which the fever is remittent or intermittent, with paroxysms which occur daily or every second day. A second variety is that which may be termed the neuralgic or rheumatoid, in which the pains in the legs and arms are extremely violent, accompanied by great hyperæsthesia, and it may be excessive pains on movement, and even by pronounced redness and swelling of the joints. There are two abortive forms, one in which the symptoms are throughout mild, and one in which the onset may be furious, with very threatening symptoms and high temperature, which, however, subside after a few hours, or at the most in three or four days, and leave no abiding ill effects.

Another form of the disease which is especially commented on by Hubner is the chronic, in which the course is protracted over many months, with remission and intermission, and recurrence of fever, and with very varying symptoms. In most of such cases there are pronounced evidences of basal meningitis, with great loss of strength and wasting.

The following are the abnormal appearances of the skin: First is most frequently observed the papilliform elevations, the so-called goose-skin, due to contraction of the muscular fibers of the corium. This is often seen in the first week. Second, a dusky mottling, also common in the first and second week in grave cases, is most marked when the temperature is reduced. Third, numerous minute red points over a large part of the surface, bluish spots a few lines in diameter, due to extravasation of blood under the cuticle, resembling bruises in appearance, and large patches of the same color, an inch or more in diameter, less common than the others, of irregular shape as well as size, and usually not more than two or three upon a patient. These last resemble bruises, and they may sometimes be such, received during the time of restlessness; but ordinarily it is said that extravasations of this kind result entirely from the altered state of the blood.

This cutaneous disease evidently has a nervous origin, the vesicles occurring in most instances on those parts of the surface which are supplied by branches of the fifth pair of nerves; its most common seat is upon the lips, occasionally upon the cheek, upon and around the ears, and upon the scalp. During the first days the skin is frequently dry; afterward perspirations are not unusual, and free perspirations sometimes occur, especially about the head, face, and neck.

The course of epidemic meningitis is entirely (as it has been observed by writers) irregular from day to day, and also as to its duration. In fatal cases death usually occurs almost immediately, or it may be postponed beyond a month. Even in favorable cases, convalescence may be prolonged almost indefinitely, due, as it is said, largely to local changes, and it is usually accompanied by gradual subsiding of the symptoms of meningitis, not rarely interrupted by relapses. Permanent loss of hearing is very common, producing in young children deaf-mutism.

Sequels which follow the disease are, partial or complete amaurosis (not rare), weakness or loss of memory, general impairment of intelligence, and even chronic hydrocephalus, local paralysis of various kinds, disorders of speech, and epileptic attacks. Bronchitis, atelectasis, hypostatic congestion of the lungs, and broncho-pneumonia are common occurrences in the course of the disease.

Diagnosis.—The diagnosis of cerebro-spinal meningitis is, during an epidemic, ordinarily not difficult. On account of the nature and variety of its symptoms, and the suddenness of its onset, it may be mistaken for scarlet fever, and *vice versa.* Redness of the fauces will settle that question within a few hours; later will be seen the characteristic efflorescence which appears on the skin in scarlet fever.

In sporadic cases it is necessary to determine the non-existence of tubercle, otitis media, syphilic, or any other cause for an existing meningitis which has been observed. Continued fever, typhus, or typhoid fever, may so resemble cerebro-spinal meningitis that it requires great care on the part of the practitioner to avoid mistake. The presence of herpes or of any non-syphilitic skin eruption is usually in favor of the epidemic disease. Rheumatism or pneumonia with meningeal symptoms is often seen. The shifting irregularity of the symptoms, the peculiarities of the range of temperature, the non-conformity of the febrile and other manifestations of the type of the pneumonia, or the typhoid, or whatever other disease it may simulate, should excite suspicion, while characteristic rigidity and muscular contraction and distinct stiffness of the neck, under such circumstances, should be looked on as conclusive. A septic meningitis is made out by finding the point of infection. Some of the milder cases of cerebro-spinal fever might be mistaken for hysteria, but the pain in the head and elsewhere, the muscular rigidity, and especially the occurrence of more or less fever, enable us to make a diagnosis.

Prognosis.—Cerebro-spinal meningitis is regarded as one of the most dangerous diseases of childhood. It is dreaded, not only on account of the great mortality which attends it, but also on account of its protracted course, the suffering it causes, the possible permanent injury to the important organ which it chiefly involves, and often the irreparable damage which the eyes and ears sustain.

Under the age of five years, and over that of thirty, the prognosis is said to be less favorable than between these ages. An abrupt

and violent commencement, profound stupor, convulsions, active delirium, and great elevation of temperature, are symptoms which should excite solicitude and render diagnosis guarded. If the temperature remains above 105 degrees Fahrenheit, death is probable, even with moderate stupor.

Treatment.—Cerebro-spinal meningitis should be treated in accordance with the general principles that govern the management of infectious fevers. Where epidemics exist, where anti-hygienic conditions prevail, we must look to the removal of such conditions, procure pure air in the domicile, wholesome diet, and a quiet and regular mode of life; all measures designed to produce the highest degree of health are of the first importance for the prevention of the disease. Cleanliness of the streets and areas (no decayed vegetable matter should exist about the premises), as well as of the apartments, good sewerage and drainage, the prompt removal of all offending or refuse matter, avoidance of overcrowding,—in a word there should be the strictest observance of sanitary requirements in every particular.

To enjoin quiet and a regular mode of life as a preventive measure during the occurrence of an epidemic of cerebro-spinal meningitis or fever, is consistent with the theory that the disease is caused by a micro-organism.

The nursing should be most careful, and the saving of the patient's strength is most necessary. The diet should be simple, nutritious, and adapted to the digestive powers of the individual patient; milk, animal broths, eggs, oysters, and farinaceous foods are necessary.

Local venesection, by the abstraction of blood with leeches, or with cups to the temples or to the back of the neck, is recommended by Stille and others. In many cases this greatly mitigates the pain and relieves the local disease. It is recommended that local blood-letting be practised with caution. Blisters have been largely used and strongly recommended. It is plain that the most that can be accomplished by them is relief of the meningeal and cerebral congestion, and that there is danger, if they are used too severely, of producing violent local inflammation, which may, as the dyscrasia of the disease becomes more and more developed, take on a very serious form. Therefore, vesication should be superficial always, and in order to be effective, must cover a large surface. It should be entirely avoided when the symptoms of the breaking down of the blood are pronounced. The best site of the blister is from the nape of the neck upward over the occiput (the head being shaved). The continuous application of cold by means of ice-bags to the head and upper part of the spine is of great importance, and it is thought that it probably has as much effect upon the local disease as has local blood-letting on counter-irritation.

A liniment of chloroform and oil of peppermint, used sparingly, rubbed up and down the spine, seems to give temporary relief, and does not hinder the use of the ice-bag. Dr. William H. Sutton, of Dallas, Texas, recorded a case of a child three and a half years of age, who

had been under treatment for supposed continued fever. When Dr. Sutton assumed control of the case, November 20, 1877, "the pupils were dilated and insensible to light; features pallid and pinched; pulse 130; temperature 103 degrees Fahrenheit; the patient totally unconscious. November 21, morning temperature 105 degrees Fahrenheit; pulse 140; evening temperature 101¼ degrees Fahrenheit; pulse 120. November 22, morning temperature 106½ degrees; pulse 160; restless; evening temperature, 105½ degrees; pulse 120. The patient had not slept, except for a few moments, for nearly two weeks. A strip of flannel saturated with turpentine was placed over the spine from the neck to the sacrum, and a hot smoothing-iron was run up and down it, and eight drops of the fluid extract of ergot were given every three hours. The father of the child stated to Dr. Sutton that as soon as the application was finished, the child fell asleep, and slept several hours,—the first for two weeks,—and the fever rapidly declined. From this time on he began to improve, and gradually and fully recovered."

The use of stimulating applications to the spine in cerebro-spinal meningitis has been long known, but the mode of application is novel. However, in cases of wry neck, "crick in the neck," or stiff neck, the above is an old-time method of using stimulating applications among the colored race in the southern states.

Internal Treatment.—The same remedies are recommended by some and condemned by others. The physician will treat his patient according to the general conditions of the case, treating symptoms as they arise. When there is high temperature, cold should be applied, opium to relieve pain in some cases; in other cases chloral hydrate is useful, especially in cases of eclampsia, or of symptoms threatening eclampsia. Bromide of potassium acts promptly on some young children, producing quiet. It causes contraction of the minute blood-vessels of the nerve-centers so as to diminish hyperæsthesia, as was shown by Dr. Putnam-Jacobi in his experiments, and by others also; and at the same time it is claimed to diminish, in a marked degree, the reflex irritability of the spinal cord. Many children, it is said, are saved by its timely use from the dangers of eclampsia; and by its sedative effect on the nervous system and contractile action on the capillaries, it probably diminishes the intensity of the inflammation and the amount of exudation. Dr. Squibb recommended it dissolved in simple cold water, which may or may not be sweetened; give four grains every two hours to a child two years old who has the usual restlessness and apparent headache, and six grains to a child five years of age. Ergot is recommended as another very important remedy. It is scarcely less useful than the bromide, as it aids in contracting the arterioles and diminishing the flow of arterial blood. In New York City, Squibb's fluid extract has been more usefully prescribed than other preparations. The efficacy of ergot is more marked during the first and second weeks, when the congestion of the nerve-centers is greatest. At a more advanced stage, when congestion occurs, and the danger arises from

inflammatory products and structural changes, the time for the use of ergot is passed, or if it is still of service, it is less needed than at first, and should be given less frequently. Chloral in proper doses rarely fails to give quiet sleep, and it is supposed by some who have studied its therapeutic action that it diminishes the cerebral circulation. It is, therefore, beneficially prescribed with bromide; five grains for a child six to eight years of age, administered with the bromide.

Antipyrine is used by some practitioners for the purpose of relieving the headache; it may be administered with the bromide. Quinine apparently does no good; it is only used as an anti-periodic.

When the acute stage has passed, measures should be taken to remove the serum which sometimes remains. For this iodide of potassium is thought to be more useful than any other agent; it is administered early along with the bromide.

The result depends to a great extent on the nursing. The skill of the physician may be thwarted, and the life of the patient lost, by inefficient nursing. No other disease more urgently requires kind, intelligent, and constant attendance night and day on the part of the nurse. Nutriment as well as the medicine must be punctually given. Constant readjusting of the ice-bags is required, and during the long period of convalescence the utmost care is needed to remove the excretions at once, in order to prevent bed-sores. Alcohols must be employed in proportion to the existing exhaustion; laxatives to overcome constipation, and mild diuretics if the renal secretions fail.

The room should be dark, well ventilated, and quiet. All sympathizing friends who are not required in the nursing should be excluded. I know of no other disease in which this injunction is more necessary, for mental excitement may produce a dangerous aggravation of symptoms.

CHAPTER XXXII.

SCARLET FEVER.

Definition.—This is a contagious febrile disease due to a specific contagion, and characterized by a peculiar diffused eruption and a pronounced tendency to the development of serious sore throat.

Etiology.—Scarlet fever is due to a specific poison capable of reproducing itself, which may pass directly by contact with the person of the sick, or be transmitted through the air, or be carried by fomites. The power of the poison to resist change is very great, as is also its ability to pass into milk and other articles of food, and to adhere to letters, furniture, toys, flowers, locks of hair, and other media of transmission. Experimental and chemical observation points to the existence of a scarlatinal microbe, but such organism has not been isolated or demonstrated. It is important to know that diphtherial organisms can often be obtained in abundance from the pseudomembranous angina of scarlet fever; but, on the other hand, the most violent sore throat with abundant exudate may exist without the diphtheritic bacillus.

The varying predisposition, susceptibility, and immunity of individuals and families are as remarkable as they are inexplicable. In a family of children one or more may escape or suffer but a mild attack, while the remaining members may, without apparent cause, exhibit the most intense susceptibility. Families residing in close proximity, perhaps in adjoining houses, and subject alike to the infection, may be very differently influenced. In one the most aggravating form of the disease may prevail, and the other will be protected by a special immunity. This absence of susceptibility may continue throughout life, or only during the prevailing epidemic, or it may continue during residence in one locality and disappear upon removal to another in the same city or to some distant village or city. Predisposition may be increased or diminished by locality. Rapid and fatal cases indicate extraordinary susceptibility. Social position and external circumstances influence the mortality, but do not seem to affect the predisposition. The death-rate increases with poverty and diminishes with affluence. Age exerts a very decided influence. No age is exempt. Children have been born with scarlet fever, and newly-born infants are occasionally attacked, but during the first year the susceptibility is not very marked. It is increased during the second year, but between two and seven years it is most intense. After the tenth year statistics show that the liability is greatly diminished, and more so after the

fifteenth year. If children can be protected during the first ten years of life, the chances of escape are greatly enhanced, and the danger is greatly lessened.

Prevention.—There is no effectual method of protecting the susceptible from the contagion of scarlet fever, except by isolation of the sick and by non-intercourse.

All experiments to secure protection by the internal administration of drugs have failed. It is said to be undoubtedly true that frequent bathing and inunctions during the period of desquamation will effectually prevent diffusion of the cast-off particles of the epidermis in the surrounding atmosphere, and thereby limit to a very considerable extent the dissemination of the poison; but it is not believed that the vitality of the poison is lessened. Walford claims that the use of arsenic given during the incubation stage will prevent or greatly modify the disease. He employs the liquor arsenicalis in as large dose as the age of the child will permit, in combination with sulphurous acid and syrup of poppy. The dose should be given daily for several days, then less frequently.

Separation and disinfection are the most effecual prophylaxes. Disinfect in a similar manner as in typhoid fever. (See Typhoid.)

Incubation.—The period of incubation varies, being in the vast majority of cases from two to eight days. There are, however, many exceptions to the general law. In occasional instances (of recorded cases) the disease has developed in a few hours after the first and only exposure; in other instances it has been delayed for several weeks. At least three weeks should elapse before the child is pronounced past the time for the contagion to make its appearance.

Pathological Anatomy.—The morbid anatomy in scarlet fever consists mainly in the changes which take place in the integument subcutaneous, connective tissue and mucous membrane of the oral and nasal cavities and throat and kidneys. The skin is hyperæmic, and the surface is more or less covered with the exanthema, which consists of numerous and closely-aggregated points, slightly red in the beginning, but rapidly increasing in redness, sometimes to a brilliant scarlet color. The points may be flat or slightly elevated, are usually circular in form, but may be elongated; marked confluence with vivid redness denotes increased hyperæmia.

The exanthema usually maintains its maximum development for one or two days, rarely less than one day, and then gradually fades, to disappear with the beginning of desquamation.

There may be an adherent false membrane due to the presence of bacteria, sometimes of the diphtheria bacillus. Superficial ulceration and deep necrosis of the tissues are not infrequent. In some instances the neighboring lymphatic glands are swollen and injected, and may contain abscesses, while the surrounding fibrous tissue is œdematous. Granular degeneration of the heart and liver and moderate acute enlargement of the spleen are present.

Symptoms.—The ordinary period of incubation of scarlet fever is from three to five days, though well-authenticated cases have been published by Trousswaus and others in which it has developed in twenty-four hours, while it may be prolonged to ten or even twelve days, or as long as three weeks.

The regular form is characterized by a well-marked exanthema angina, and more or less fever. It may begin suddenly, or be preceded by a day or two of indefinite indisposition, during which time the patient will complain of headache, with general malaise, and loss of appetite. The tongue will be slightly coated. The bowels, as a rule, are constipated; occasionally there may be some looseness. In some cases there will be marked sluggishness, and in others fretfulness with loss of sleep. Most frequently the disease begins most suddenly with a chill, vomiting, a convulsion, or a high fever, associated with the usual phenomena of high febrile action,—headache, frequent pulse, flushed face, thirst, sparkling eyes, anorexia, twitching and starting, and perhaps delirium or stupor. A slight diarrhea may supervene. These symptoms continue without abatement, and sometimes are increased, until the appearance of the eruption, which may occur in a few hours, or be delayed one, two, three, or five days, or later.

The rash appears first about the neck, chest, and shoulders, in indistinct points, increases rapidly in redness, and extends over the trunk and extremities, reaching its maximum development in rare cases during the first day, but most usually during the second, and in some cases not before the third or fourth day. Under pressure with the fingers the color disappears, but reappears immediately upon removal of the pressure. Ordinarily the rash is uniform, but it may be in patches. It is especially dark colored in the groin, and in the folds of the skin made by flexion of the skin. On the nose, lips, and chin the rash may be wanting, while it is always very pronounced on the cheek. The eruption attacks the mucous membranes, so that the cheek and the throat are a brilliant red, swollen, and often distinctly punctated. The tongue is covered with whitish fur, with red papillæ, called "strawberry tongue." A few days later desquamation leaves the surface of the tongue red and rough, with greatly enlarged, very dark red papillæ,—"raspberry tongue,"—a condition which may last five days. At this stage the tonsils are swollen, and their crypts distended with a yellowish-white creamy exudate, which often spreads over the surface, making a sort of false membrane.

Lasegue's contention that at this stage there is a vascular eruption upon the mucous membrane, seems plausible. The submaxillary glands and the surrounding cellular tissues are always swollen. The lips are dry and crack at the angles. Niven says the breath is peculiarly sweet, almost aromatic, in the early stage of the disease; but when the angina is severe, and more especially when ulceration occurs, the breath is foul and fetid if suppuration and sloughing have taken place.

Sudden and marked elevation of the temperature, with corresponding rapidity of the pulse, is one of the most common initial and characteristic phenomena of scarlet fever. At the onset the fever may reach 102 degrees Fahrenheit, and rapidly rise during the day to 105 degrees or 106 degrees Fahrenheit. In some cases it may reach even a higher elevation of temperature in a few hours. In a majority of cases it will either continue during the period of development and maximum intensity of the exanthema to range between 102 degrees and 104 degrees Fahrenheit, or gradually rise during each succeeding day until the exanthema has reached its maturity, and then lessen daily with the disappearance of the rash, until the normal is reached with the beginning of desquamation. The course of the fever is marked by remissions and exacerbations. In this form the temperature does not often reach over 106 degrees Fahrenheit, and the highest point is usually reached during the period of maximum intensity of the rash. With the rise and fall of the temperature the color of the rash varies, increasing with the elevations and lessening with the remissions. During the period of high fever there is usually active delirium, in some cases stupor, and in others twitching and jerking, tossing about in the bed, moaning, and occasionally screaming as if in pain.

The pulse ranges high from the beginning, and continues so with corresponding increase in frequency with the rise of the temperature, sometimes reaching 160 or more per minute. It diminishes in rapidity, but not correspondingly with the fall of the temperature. Usually it continues rapid until convalescence is established. Sometimes the temperature drops and the rash fades on the second or third day, both to reappear in a day or two. While the protective powers of an attack of scarlet fever can not be denied, yet it is certain that, in susceptible individuals, there may be repeated attacks, which consist simply of a bad sore throat with some febrile reaction.

Three types may be recognized: The simple, the anginose, and the malignant.

The simple scarlet fever is that characterized by a contagious febrile disease, and a peculiar eruption diffused, and a pronounced tendency to the development of serious sore throat.

In the anginose scarlet fever the throat symptoms appear very early, and are attended with great swelling, and with the rapid formation of a membranous exudation, which may extend upward into the nostrils, and forward into the mouth, and downward into the pharynx and larynx.

Irregularities of the angina are frequent. Instead of declining with the disappearance of the rash, it may become worse. Suppuration and gangrene may occur. Diphtheria may set in at any time, either during the continuance of the angina or after it has subsided. The implication of lymphatic and glandular structures in close proximity may persist and progress to the formation of abscess. The regular may be transformed into the irregular form at any stage by the

development or aggravation of a pre-existing local affection. It quite often happens that a case will pursue a regular course for a time, and then suddenly assume an irregular and graver form. In rare instances this is liable to occur independently of any local affection, and is probably due to some constitutional peculiarity.

The excessive fetor, the rapid swelling of the glands of the neck, and the tendency to necrosis of the mucous membrane, may make a picture indistinguishable from that of malignant diphtheria, and death may result from septicæmia produced by the local disease of the throat, or ulcers may open the carotids, or blood-vessels, and cause fatal hemorrhage.

Inflammation of the Eustachian tube and of the middle ear are common phenomena.

Malignant Forms.—This form of scarlet fever, fortunately, is not so common as the others. It refers especially to the combinations of dangerous nervous symptoms with hyperpyrexia. Its beginning is expulsive, so to speak. The initial symptoms are violent headache, vomiting, dyspnœa, high fever, cyanosis, convulsions, delirium and coma, which sometimes continue without abatement for one, two, or four days, when death takes place; or the attack may seem not overwhelming, but be followed in a few hours by violent adynamia, with great heart failure, weakness of the extremities, excessive dyspnœa, and nervous phenomena. Sometimes the malignant symptoms first develop after the appearance of the eruption, which may be intense and widespread. Then, again, a case may appear with convulsions, followed by coma and death within twenty-four hours, before the appearance, or time for the appearance, of the rash. In most cases of malignant scarlet fever, vomiting is most pronounced, and often there is diarrhea. A sudden rise of temperature immediately preceding death is also frequent, even at a time when the extremities are very cold, and the patient in collapse. In the hemorrhagic malignant scarlet fever, epistaxis and abundant hematuria may precede or follow the occurrence of the purpuric and petechial eruption, and death may take place almost immediately in collapse, or be preceded by intense fever, violent dyspnœa, convulsions, and delirium. A rare form of malignant scarlet fever is that wherein all the symptoms are lost in a furious choleraic diarrhea.

Relapses in scarlet fever are rare, but do occur, with the reappearance of the fever, the sore throat, and the eruption. The time of their appearance is from twelve to thirty-six days after the first attack.

Complications and Sequelae.—These are too numerous to mention all; to some only brief references will be made. The complications of scarlet fever are often very serious. Diphtheria may develop, and is usually a fatal complication. There may be a widespread gangrene of the throat without diphtheria. Aggravated angina, attended with ulceration and sloughing, is a serious and sometimes fatal complication. In some cases the enlarged lymphatic glands harden into a

brawny mass, exceedingly intractable to all medical treatment. Middle-ear inflammation is said to occur in about thirty per cent of the cases, and according to Burkhart-Merian a severe suppurative otitis-media develops in about four and a half per cent, usually during the period of eruption, revealing itself by violent earache, insomnia, and excessive tenderness of the mastoid processes. Few cases escape a mild coryza. Bronchitis and pneumonia are not so frequent complications as inflammations of the serous membranes. Pleurisy, peritonitis, pericarditis, and endocarditis are rare but grave complications. They usually set in during the second week of the disease.

Pleurisy and pericarditis are said to be generally associated with joint inflammations, which ordinarily follow the course of so-called scarlatinal rheumatism. Of this disease there are three forms: That in which the exudate is serous; that in which it is primarily serous and secondarily purulent; and that in which pus is formed from the beginning. The affection generally begins from the fifth to the seventh day of the fever, or rarely during the stage of desquamation. It sometimes attacks many joints, but is usually localized in a single articulation. Recovery in the course of a few days is common with the serous exudate; recovery with more or less permanent changes in the joint is the rule when the exudate is first serous and then purulent; but when from the beginning pus forms in the joints, death from pyæmia is the common ending. It is thought that these complications are due to streptococcus poison from the throat. Convulsions occur often at the onset of the disease, and are not necessarily an alarming symptom; but when recurring or occurring during the progress of the disease, they are a very fatal complication. Nervous disturbances of variable character are usually not severe; hemiplegia, chorea, paraplegia, mania, and paralysis of single nerves have been observed. Neuralgia, hyperæsthetic and anæsthetic conditions, epilepsy, hysteria, and a variety of mental disturbances, have followed scarlet fever.

Nephritis.—Nephritis may appear as either a complication or a sequel of scarlet fever, and is considered the most important. As a sequel it may not appear for several weeks after convalescence. No patient ought to be considered safe until six weeks have elapsed. In some cases it is febrile phenomena, but in most cases it is the effect of scarlatinal poison, and in others it may be due to indiscretion in diet or to improper exposure. The characteristic nephritis of the disease develops most frequently in the second or third week to the fourth or sixth week. It may appear in a mild form of the disease, and come on when all the symptoms seem most favorable. The first evidence is the diminution in the quantity of the urine, and usually an anasarca just below the eyes, which often is first detected in the early morning. The nephritis varies greatly in intensity; in the severest forms there are aching pains in the back, chills, vomiting, hematuria, and partial or even finally complete suppression of the urine, with uræmic symptoms after some hours. In other cases the symptoms are so mild that

they are scarcely to be noted, consisting of a little albuminuria, a few casts, and some œdema. Dropsy is usually later, but may be one of the early symptoms. Oedema of the lungs and acute œdema of the glottis are more frequent in severe than in mild cases of scarlatinal nephritis, but may suddenly appear in any case.

Diagnosis.—In a majority of cases, when first seen by the physician the diagnosis is made at a glance. The diagnosis of scarlet fever in the stage of incubation depends upon the severity of the symptoms; the presence of vomiting, and the rapid rise of temperature, a characteristic exanthema, and angina, or either separately, with a moderate or a high fever, will be sufficient. The prevalence of the disease, or the fact of the exposure of a susceptible person to the contagion, is always proof, and frequently in cases of doubt is sufficient to establish the diagnosis. The rashes produced by antipyrine, belladonna, oil of copaiba, and some other drugs, resembling somewhat the rash of scarlet fever, may be excluded by the absence of sore throat and fever with the presence of other symptoms of poisoning, which usually make the diagnosis not difficult.

The diagnosis between diphtheria and scarlet fever is not always possible, because diphtheria is sometimes accompanied by a scarlatinal rash, whilst Loeffler's bacillus may be present in scarlet fever. The pure diphtheria may simulate scarlet fever, and frequently both diseases are associated together; and, fortunately, so far as treatment is concerned, it would be precisely that of diphtheria simulating scarlet fever.

Prognosis.—The mortality in scarlet fever varies in different epidemics and under different circumstances from one to forty per cent, according to the various authors upon the subject. In children under one year the death-rate is very high, but it diminishes after the first year, until it reaches its minimum between six and twelve years of age. Any previous disease greatly increases danger. Pyæmia and septicæmia are usually fatal. Continuous delirium and coma are ordinarily the signs of a speedy death. Abundant hemorrhagic extravasations, hematuria, however mild,—these signs are accepted as unfavorable, and very painful swelling of the submaxillary gland is of evil import. The majority of cases of nephritis recover under careful treatment, but a complete early suppression of urine is very dangerous.

Treatment.—Absolute isolation in a freely-ventilated room, with all the precautions as to antisepsis and asepsis in general, and good hygiene, etc., which have been thoroughly discussed in typhoid fever (see Typhoid), are essential in the treatment of scarlet fever. The attending physician should carefully supervise the disinfection of the sick-room. It is said there is no remedy which has the power to affect the course of the fever; the symptoms must be met as they arise. Wood recommends: "When the vomiting is very severe, carbonic-acid water, lime-water and milk, and bismuth will often be found effectual. If these fail, a quarter of a grain of cocaine, in solution, every one or two

hours, may be tried for a few doses, for the relief of nervousness and insomnia; the bromides, trional or sulphonal, and chloral, used carefully, are of value. Hyascine in very minute doses is said to act well in controlling the delirium and producing sleep; but it is an extremely dangerous remedy, as by increasing the dryness of the throat and probably also producing paralytic weakness of the throat, it tends greatly to increase symptoms of suffocation in anginose cases; we have seen it apparently cause death in this way. In order to maintain the secretions, and especially to lessen the strain upon the kidneys, the child should be encouraged to drink cold water, simple or carbonated, freely."

Shakhovsky asserts that salicylic acid will prevent all complications, such as uræmia, dropsy, diphtheria, anginas, and lymphadenitis, and will remove them when present. He employs the following formula:—

℞: Acid salicylic.....gr. xv
Aqual distill. fervid.....℥ij
Syrup aurantii .....℥j
Mix.

Give from one to four teaspoonfuls every hour during the daytime and every two hours by night; to prevent relapses the mixture must be continued at longer intervals for several days after defervescence.

There are other authors who claim that salicylic acid, mercurials, and belladonna have no power to affect the course of the fever, although they have been recommended as specifics.

Antipyretic treatment is most essential. Phenacetine, antipyrine, and antifebrine will reduce the temperature; but grave danger often accompanies the free use of any of these remedies, although, on the other hand, small doses, given at regular intervals, may do great good in quieting the nervous disturbances and aid in reducing the temperature. Quinine has been strongly recommended; but it has to be given in large doses to have any distinct effect, a practise which, in the opinion of some authors, is not thought to be justifiable. On the other hand, if given in moderate doses, it is probably of service, being intended to reduce the temperature as well as to support the nerve centers. The bisulphate is recommended as the best form, as it is more easy of absorption; and if the stomach becomes irritated by its use, it should be given by the rectum, not in suppositories, but in slightly-acidulated (tartaric-acid) solution.

When the temperature of scarlet fever, which is 102.5 degrees Fahrenheit, does not last over a few days, it does very little harm. When it rises to 103 degrees Fahrenheit or above, cold should be used externally, first, by sponging, and if this fails, by packing or by bathing. The temperature of the bath must be in proportion to the resistance of the fever; in most cases a bath temperature of 85 degrees Fahrenheit, gradually reduced to 80 degrees or 75 degrees Fahrenheit, is said to be the best. The cold pack, or the bath, or

whatever means are employed, must be used until the desired effect is produced, and the treatment is to be repeated whenever the temperature rises to 103 degrees Fahrenheit. Leeter's tubes are recommended to be applied to the head and to the abdomen, and, with ice-water run through them, these sometimes suffice. The more rapidly the water passes through the tube, the more rapid is the abstraction of heat. This method has accomplished satisfactory results in cases where antipyrine has proven dangerous because of the collapse following its use. Alcoholic stimulants may have to be resorted to while the abstraction of heat is being accomplished, so as to avoid exhaustion. If heart failure is threatened, alcohol, digitalis, quinine, and the carbonate of ammonia may be demanded. In taking a patient out of the bath there may be a tendency to relapse, when stimulants must be freely used just before the patient is put to bed. It may sometimes be very necessary to apply hot-water bottles or bags to the extremities while the patient is in the bath.

The constitutional treatment (adynamia) in scarlet fever is similar to that of exhaustion from other fevers. (See Typhoid Fever.) On account of the irritation of the stomach or its tendency to irritation, and also of the kidneys, ammonium carbonate and any irritating drugs must be avoided.

The local external use of ice by India-rubber bags fastened about the neck, or around the neck underneath the jaws, is often advantageous, while small pieces of ice may be allowed constantly to melt in the mouth. Potassium has been largely used in scarlet fever, and is often of service as a local remedy to the throat. Spraying the throat out with peroxide of hydrogen solution has seemed to us the best of all local treatment. The official preparation may be used in full strength or diluted one-half. The nostrils should also be sprayed if there is a tendency to the nostrils closing; if possible they should be sprayed from behind if not from the front. Tincture of ferric chloride, solution of silver nitrate, glycerite of tannin, and various other astringent solutions are employed by different physicians as local applications. When suppuration of glands occurs, a free incision should be made at once. Cosmoline will allay the itching and burning of the skin; also cocoa butter, cold cream, olive-oil, or other bland fats, as goose or turkey oil, should be freely applied to the surface of the body morning and evening after the first or second day of the eruption.

When the eruption retrocedes or fails to develop, a hot mustard bath, or, if there be high temperature, the cold mustard bath, will often suffice. The treatment of nephritis is the same as that of acute nephritis from other causes.

CHAPTER XXXIII.

DIPHTHERIA.

Diphtheria is one of the most dreaded, one of the most fatal, and one of the most common maladies of childhood. It is a highly contagious disease, characterized by fever, usually by a pseudo-membranous inflammation of the pharynx, and often by symptoms of a toxæmia due to the presence of a specific bacillus, whose growth produces the poison which is absorbed. The specific principle is ordinarily received by the inspiration of infected air, but it is sometimes received by direct contact of infected matter with one of the surfaces not lying in the respiratory tract.

Etiology.—Oertel's views in regard to the virus of diphtheria express all that is known at present of the etiology of the disease. The nature of the virus is still obscure; it acts upon cells, causing their death and disintegration, and the infected particles convey the virus to other cells. The virus causes hyaline degeneration in the tissues; the hyaline degeneration in the walls of the blood-vessels causes them to rupture, producing hemorrhages. Oertel expresses the opinion that bacterial organisms cause diphtheria, and that they produce this result not by their direct action, but by producing a ptomaine which infects the system and causes the disease to be constitutional. The microbe itself is mostly confined to the surface, whereas the action of the virus is "widespread and deep." The most eminent pathologists of the present time do not express any more positive opinions in reference to the specific principle or germ of diphtheria than is contained in the above summary of Oertel's views. Dr. Pruden has made systematic study of a series of cases of diphtheria, which would seem to indicate that a streptococcus which is almost constantly present in the pseudo-membrane probably stands in a causative relation to the disease.[1]

Diphtheria occurs in all countries, at all seasons, but particularly during the colder months of the year. Overcrowding favors the extension of the disease, especially the presence of large numbers of children in schools. Predisposing causes are bad hygienic surroundings, especially filth, dampness, and poor ventilation. McCallom states, however, that imperfect drainage and insalubrious conditions are not important in increasing the frequency of diphtheria, this disease having been found more prevalent in localities in which there was no fault to be found with hygienic conditions than in sections where the reverse was

[1]See *American Journal Medical Science*, 1889.

the case. Children, especially the young, are more prone to the disease than adults.

Sucklings are rarely affected; persons debilitated from any cause are liable to take the disease.

"The immediate cause is universally admitted to be the bacillus discovered by Klebs in 1883, and obtained in pure cultures in 1884 by Loeffler, who demonstrated its pathogenic importance. This bacillus, the Klebs-Loeffler, or diphtheria bacillus, is a slender rod, usually slightly bent in the middle, its extremities club-shaped, and tending to become more deeply stained than the other parts. The bacillus inclines to form groups of two to five, lying parallel; it is nearly as long and twice as broad as the tubercular bacillus; it thrives in milk, and grows readily upon the mixture of blood, serum, and bouillon recommended by Loeffler, colonies being formed in the incubator in the course of twelve hours before any considerable growth of associated bacteria has taken place. When kept in darkness in a moist state it lives for months." (Wood.)

Morbid Anatomy.—In the catarrhal inflammation the mucous membrane of the tonsils, uvula, soft palate, and pharynx are swollen and of a dark-red color. Its surface is at times covered with a mucous membrane, which is sometimes opaque from the presence of abundant leucocytes. The tonsillar crypts may contain opaque, grayish-colored, or yellow material not projecting above the surface, and cells consisting of cells, granules, and bacteria. The catarrhal inflammation alone may exist, and the pseudo-membranous and gangrenous inflammations are usually associated with the catarrhal variety. The appearance above described is not to be distinguished from those occurring in non-diphtherial varieties of sore throat and in lacunar or follicular forms of tonsillitis, except by the bacteriological examination.

The pseudo-membranous sore throat of diphtheria affects the upper surface of the soft palate, to the nostrils, pharynx, and larynx, even to the trachea and bronchi; the bacilli may be found upon the conjunctivæ, upon the genital mucous membranes, and upon wounded surfaces of persons affected with diphtheria. These first appear as spots or patches of a grayish-white, and surrounding the gray patch is a yellowish or cream-colored border, changing from this to a yellowish-brown, then into a very darkish-brown as the disease progresses.

The pharyngeal inflammation may extend into the Eustachian tubes, while its continuance is frequent into the larynx, trachea, and bronchi. Above the vocal cords the false membrane is intimately adherent to the mucous membrane, but below these cords it is generally but loosely attached, and often lies upon the inflamed mucous membrane. In the trachea it is apt to form a hollow cylindrical cast of this tube. The same is true of the larger bronchi. The lungs are usually distended, injected, and contain numerous patches of lobular atelectasis and nodules of broncho-pneumonia. The lymphatic glands beneath and behind the jaw are enlarged. The spleen is enlarged,

also the kidneys; the capsules of the kidneys are readily detached; the surface is at times speckled with extravasated blood. (Fitz.)

Symptomatology.—The especial feature suggestive of diphtheria is the formation of a false membrane. This appears first as grayish-white patches, often formed in the course of a few hours, and rapidly increasing in size. The symptoms of diphtheria may arise in two or more days after exposure. Pain in swallowing is an early symptom, accompanied by fever. The fever may be preceded by a chill. The temperature usually rises from 102 degrees to 104 degrees Fahrenheit, and the inflammation (dysphagia) may be slight or considerable. The higher the fever, the more probable the occurrence of headache, backache, loss of appetite, and weakness. The patches, it is to be remembered, may be present on the soft palate, or in the pharyngeal pouch. As the disease progresses, the patches coalesce, and extend to the uvula and soft palate, and in children with large tonsils the voice becomes thick, the lymph glands moderately swollen and sensitive, and the urine is likely to contain a small degree of albumin.

The severe cases of diphtheria are more conspicuous in character because of septic symptoms. The temperature may be high, 104 degrees Fahrenheit at outset, or rise on the third or fourth day. It may, however, be only moderately elevated, or even subnormal. The pulse is rapid and weak, corresponding to the range of the temperature. The patient may be delirious, and have no appetite. Vomiting and diarrhea are frequent. The breathing is slow, or perhaps rapid and noisy, and the voice is hoarse. A thin acrid discharge flows from the nostrils, producing sores or crusts on the lips. The mouth is usually open, the tongue dry and fissured. The false membrane is found throughout the pharynx, either diffused or in patches, and forms a thick, opaque, yellow cyst resembling washed leather, or it may be a dark-brownish color. In the gangrenous cases the pseudo-membrane patches become green or brown, are moist and shreddy, and of a very offensive odor. Hemorrhages from the mouth and nose are frequent and sometimes considerable, and they may also occur in the skin.

In severe cases of diphtheria as it progresses, there are suffocating symptoms, and septicæmia.

Croupous symptoms may develop suddenly or gradually. When the symptoms of septicæmia are prominent, the prostration of the patient is extreme, and swallowing is difficult, due largely to paralysis of the soft palates. It may be necessary to feed the patient through a stomach-tube. The pulse is weak and irregular, and the heart sounds are faintly heard. Death may occur suddenly and unexpectedly from cardiac paralysis even during apparent convalescence.

Diagnosis.—The earlier the diagnosis is made, the more important it is, so that proper remedial measures may be employed at the beginning, as well as measures designed to prevent the spread of the disease. In a large proportion of cases the diagnosis is easy after diphtheria has continued twenty-four hours, since, in addition to the fever,

and pain in swallowing, the characteristic grayish-white patches have begun to form over one or both tonsils. In some cases the diagnosis is postponed for two or three days, because some children are not old enough to express their early sensations, so do not complain of pain. The diagnosis ultimately depends upon the discovery of the Klebs-Loeffler bacillus in a case of sore throat. In a locality where diphtheria is prevailing, the child's fauces should be examined by the attending physician, especially if there is fever, and often evidences are found of diphtheria which, without an examination, would not have been detected. In many cases it is impossible to make a diagnosis until the disease has been under observation some days, and its progress and the character carefully noted, the difficulty in diagnosis arising from the fact that the membranous exudate is concealed from view. In nasal diphtheria the pseudo-membranous exudate is concealed from view; it may be located upon the superior and posterior portions of the Schneiderian membrane, and therefore, invisible, while the anterior and visible portions of the nares and facial surface are hyperæmic and secreting mucopus in an abundance, but are free from the pseudo-membranous exudate.

In laryngeal-tracheal diphtheria, diagnosis is not infrequently delayed in a similar manner. All cases of membranous sore throat, whether appearing as lucana tonsillitis, fibrinous, or diptheritic tonsillitis, or pharyngitis, are, or should be, regarded as diphtheria until the bacteriological examination has denied the presence of the specific bacillus. Cases of membranous rhinitis are also reported to be regarded as nasal diphtheria unless the absence of the Klebs-Loeffler bacillus has been demonstrated. A pseudo-membranous inflammation of the throat, tonsils, soft palate, and uvula may occur in scarlet fever, measles, typhoid fever, and in other infectious diseases. The membrane may present nothing by which it could be distinguished from diphtheria. The diphtheritic pharyngitis in scarlet fever mostly resembles that occurring in diphtheria. The fever is high and more continuous, the swelling is greater, the Eustachian tube is inflamed, and the eruption of this disease soon appears. In young children the tonsillitis accompanied with exudation limited to the crypts or extending beyond them, whether false or not, might or might not be due to diphtheria. A bacteriological examination will clear up the diagnosis.

Prognosis.—The prognosis of diphtheria, like that of scarlet fever, varies greatly in different cases according to its type. In some epidemics it is very mild; in others it is very fatal. Between the mild and the most severe cases, attended by profound blood-poisoning, there is every grade of severity.

The prognosis is usually favorable when the inflamed surface and pseudo-membrane are of little extent, the fever and swelling moderate, and the neighboring lymphatic glands and underlying connective tissue but little involved.

Nasal diphtheria, which is commonly present in severe cases, and which produces an offensive, irritating, and highly infectious discharge,

always involves great danger. It is likely to give rise to systematic infection, by conveying the virus to the different parts of the system by the means of the lymphatics. If while the local disease is severe and extensive, the breath and exhalations become offensive, and the countenance and surfaces generally begin to have a dusky, pallid hue, profound blood-poisoning has occurred, and the patient will probably die.

The prognosis in any case of diphtheria is always doubtful, since the mildest cases may become severe, and the severe cases may improve. The prognosis among children (especially young) is looked upon as grave; sucklings, however, are rarely affected. Convalescence from a mild case of diphtheria usually occurs toward the end of the first week, while in septic cases the disease may continue for a period of two or three weeks. The range of temperature is less indicative of the degree of the toxæmia than are the extreme prostration, swelling of the lymphatic glands, offensive discharges from the mouth and nostrils, and abundant albuminuria. Diphtheritic paralyses are usually recovered from unless respiration and circulation are conspicuously affected, and especially when there is paralysis of the diaphragm.

Treatment.—The most efficient method of preventing diphtheria is isolation, and disinfecting the patient, the apartments, bedclothes, furniture, and prevention of all noxious gases, especially those ascending from the sewers and from filthy accumulations of all kinds. The utmost care should be exercised to see that discharges from the mouth, nose, and bowels, and the urine, are at once thoroughly disinfected. (See Typhoid Fever.) Keep the room well ventilated, but allow no draughts, and the temperature of the room at about 70 degrees Fahrenheit, with the air thoroughly moistened by means of a teakettle boiling in the room. No one should enter the room except the nurses and the medical attendants, who should take the greatest care to avoid personal infection from discharges and also the infection of others by carrying the poison upon their clothing. Thus the doctor and nurses should put on a linen duster, apron, or other similar garments whenever they come to the patient, and disinfect themselves before leaving the house. Deaths have occurred to nurses from the lodgment of a piece of infected mucus in the eye or upon some abrasion during the local treatment.

The efficacy of sulphur fumigation against infection has been denied and reaffirmed upon good authority, and observations, apparently made with accuracy and care, have been reported from time to time to prove both sides of the question; but at the present time the weight of the highest authorities in bacteriology is against its doubtful efficacy. Many bacteriologists have admitted that burning sulphur would kill bacteria, but not germs.

Dr. Squibs states: "If there be no moisture supplied to the burning sulphur in fumigating the apartment, that which was present in the air and in the surfaces of the chamber is soon used up, and the dry

gas remains indefinitely, in comparatively inactive and ineffective conditions. The dry, passive anhydrate would necessarily destroy all organisms which breathe in any degree, because breathing surfaces are moist. But in embryonic life protected by a shell, as in seed, if the shell is dry, the gas would be impotent." The above statement conveys very important information. It is so important that the specific principle of diphtheria should be destroyed wherever this disease appears in order to prevent its propagation, that any safe measures which would aid in producing this result should be employed in addition to sulphur-burning. Hence a vessel of water should be kept boiling in the chamber while the sulphur is being burnt.

The tendency of the disease is usually toward exhaustion. The child should be kept as quiet as possible, and not be encouraged to play with toys during early convalescence. Whenever there are signs of cardiac failure, the horizontal position should be rigidly persevered in or enforced. Sustain the child with the most nutritious and easily-digested food,—milk, soft-boiled egg or egg-nog, soups thickened with mashed potatoes, tapioca, sago; but other foods, such as sweetbreads, birds, and young chickens, should be used on occasions when the child is able to swallow easily. Alcoholic stimulants should be given when there is exhaustion. At first they should be given with the food and in moderate doses; in the later stage of the disease they should be employed more freely, both with and without food, as the case seems to indicate.

Experience has shown that the only way of controlling the inflammatory action of the throat is to destroy the bacillus; various means are used for this purpose. Ice is very useful; ice-cream is a pleasant mode of employing ice. Hot poultices to the throat sometimes subdue the inflammation to a little extent. A strong current of galvanism may act very beneficially in subduing the inflammation, relieving pain, and lessening the haste of the bacillus. It should be applied by means of a small nasal electrode, properly loaded with a bit of absorbent cotton dipped in peroxide of hydrogen sol., and carried through the nose (it may be dipped in ten per cent or six per cent sol. of cocaine before inserting in the nasal cavity) till it reaches the posterior part of the uvula. This pole is positive. If there is difficulty in passing it through the nose at first, when an obstruction is reached, apply the current, and give five to ten milliamperes for five minutes. The negative pole is placed over the throat corresponding to the side being treated. If nasal treatment can not be given, then it may be applied through the tonsils externally, the same as for catarrh. (See article on Electricity.) The electricity, by its peculiar action, aids in cleaning out the debris. It is of a solvent nature, and causes free secretion in the mouth and throat; it renders the bacilli less active, and their clinging is temporarily destroyed; hence the child is able to discharge it from the mouth. The seance should be mild internally and strong externally, and repeated every six or eight hours. After each seance,

spray the throat with a solution of peroxide of hydrogen. Between the treatments give the child ice-cold food. Leiter's tube or other ice receptacles should be kept applied to the throat, remembering to put a piece of flannel between the ice-bag and the throat. For cleaning out the nose, use a weak solution of sulphurous acid, alternately with peroxide or dioxide of hydrogen, from twenty to fifty per cent. Atomization with a saturated solution of boric-acid solution is prescribed by many physicians.

There is nothing which will help to clean out the nose equal to galvanism. The nasal cavity should be kept cleaned out, and this it is often very difficult to do. The electricity aids wonderfully in relieving the congestion of the mucous membrane of the nose, enabling the child to discharge the mucus collected; then, following the galvanism, an antiseptic spray may be used of hydrogen peroxide; use a four or six per cent solution of cocaine in irritable cases; it may be applied by means of a spray or absorbent cotton swab before commencing the galvanic treatment. Simple solutions of common salt, one per cent of carbolic acid, or a saturated solution of boric acid, have all been recommended. Loeffler recommends a ten per cent solution of sodium sulphite, which may be used with satisfaction. In the case of adults the better plan is to introduce the nozzle of an atomizing syringe horizontally into the external nostril, and give a free injection with such freedom and force that, if possible, it shall force its passage through the other nostrils; or in adults the nostrils may be cleaned out by throwing the spray of an atomizer into the posterior nose through the pharyngeal opening.

Astringents that are largely used for shrinking up the mucous membrane, are such as silver nitrate from six to twenty per cent solution; perchloride of iron has been especially employed in various forms. Monsel's solution is a favorite; and it is less irritating than the chloride, and is said to be equally efficient.

As solvents of the false membrane, animal ferments, such as pepsin and trypsin, and vegetable ferments, such as papain, have been very highly recommended from time to time. They are entirely safe, producing little or no irritation. Lime-water has been much used, and it is thought that it acts as a solvent. Lactic acid is considered a very efficient solvent. Lennox Browne recommends the pure acid to be applied to the throat by means of a dense swab of absorbent cotton, with sufficient firmness of pressure against the mucous membrane to detach the edges of the membrane. The other astringents may be applied in like manner, such as the silver nitrate and the iron.

In the first stages, germicides have been used with the view of destroying the bacillus. The small spots of membrane are carefully touched with a concentrated carbolic acid; later, glycerine, containing three to five per cent of carbolic acid, may be used upon large, diffused surfaces. Loeffler's solution, which is composed of ten grams of menthol diluted in thirty-six cubic centimeters of toluol and added to four

cubic centimeters of liquor ferri sesquichlorati (Br. Ph.) and sixty cubic centimeters of absolute alcohol, has been much used abroad, applied in full strength by the swab or diluted by atomization.

The biniodide of mercury is to be preferred to corrosive sublimate, because it does not precipitate serum albumen, and is, therefore, more penetrating; it is also less apt to undergo decomposition. Mercurial preparations should be applied by means of some sort of an atomizer, and a known quantity of the mercurial should be thrown into the throat, so as to avoid any possibility of giving too much of it, especially when calomel or corrosive sublimate is being given for its general effect.

There is no known specific drug for diphtheria. Some writers say that chloride of iron has no influence upon the disease, neither does potassium; chloride has no control over the bacillus, it being largely eliminated by the saliva, and is not sufficiently germicidal to be of value. The tincture of the chloride of iron seems to us, however, to be indicated for its tonic effects if nothing more, inasmuch as the bacillus is a destroyer of the red blood corpuscles, and its influence upon the kidneys would be beneficial. It should be given, if at all, in small doses at short intervals in a little glycerine and water. Calomel and soda rubbed together, or calomel simply, has for the last few years been largely used as a dry powder for its local effect; it should be given in the beginning of the attack, and in doses ranging from one-quarter to one-half grain every two hours until free purgation is produced; and later on in the disease, if the constitution will permit it, that is, if there is no depression, the calomel may be repeated, as it seems to aid in loosening up the false membrane. If corrosive sublimate is preferred, one seventy-fifth of a grain may be given every two hours to a child two years of age; at six years one-fortieth or one-fiftieth of a grain, according to the constitution of the patient; at ten years of age one-thirty-fifth of a grain. Pilocarpine has been employed to a considerable extent on account of its causing free secretion in the mouth and throat, and thereby loosening the false membrane. Some authors object to its use, because too free secretions are provoked by its use, filling up the bronchial tubes so as to interfere with respiration.

Stimulants,—alcohol, strychnine, digitalis, and strophanthus,—are of great value.

Nasal hemorrhage often occurs in case of nasal diphtheria. A small roll of absorbent cotton, saturated with a fifty per cent solution of dioxide of hydrogen, may be used to plug up the nasal passage. When the fever temperature reaches 102 degrees Fahrenheit in diphtheria, the patient may be sponged with tepid water gradually cooled down by adding cold water. If this fails, cold packs or the bath may be employed. The bath temperature should be started at 90 degrees Fahrenheit, and gradually reduced as low as 70 degrees Fahrenheit if necessary. It is important that the treatment be no more severe than absolutely required for the reduction of temperature, and when

the thermometer in the mouth or in the rectum indicates 100.5 degrees Fahrenheit, the patient should be taken out of the bath. In feeble cases the hot-water bag is put to the feet during the bath.

Turpentine has been highly recommended by physicians of experience, when used locally as well as internally, for its prompt action in arresting the formation and extension of the pseudo-membrane, and as an antidote to the diphtheritic virus. Dr. Rewentauer states that an infant of two years, treated by other remedies, began to have symptoms indicating invasion of the larynx on the fourth day. Tracheotomy was resolved upon, but previously trial was made of pure turpentine in a teaspoonful dose. The croupiness ceased, other symptoms improved, and the patient recovered without tracheotomy.[1] Rose, of Hamburg, "employed turpentine in teaspoonful doses mixed with spirits of ether (ether one part, alcohol three parts), three times daily. A teaspoonful of a two per cent solution of salicylate of sodium was also given every two hours. Under this treatment the temperature and the pulse diminished, other symptoms improved, and in fifty-eight cases thus treated by Dr. Rose ninety-five per cent recovered."[2] Eigel also employed turpentine in teaspoonful doses in forty-seven cases, in fourteen of which the question of tracheotomy arose. A manifest reduction of temperature followed the use of the turpentine. The percentage of deaths in all thus treated was 14.9, while of those treated by corrosive sublimate, salicylic acid, potassium chlorate, etc., 32.5 per cent died. Dr. Llewellyn Eliot also reports good results from the vaporization of turpentine.

The above use of turpentine in diphtheria will be of great interest to mothers. It is a praiseworthy domestic remedy, properly used.

The prolonged inhalation of the vapor of the oil of turpentine, which has been so much employed, is prescribed as follows: it is mixed with water in the proportion of two tablespoonfuls to one quart of water.

℞: Acidi carbolici, ol. eucalypti, aa.....ʒj
Spirits turpentine.....ʒviii

This is placed in a shallow vessel or vessels with a broad surface, and maintained in a constant ebullition or simmering, upon a gas or other stove. The vapor, which is not unpleasant, soon fills the room and the adjoining rooms. As regards the effect on the patient, the turpentine vapor passing over the inflamed surfaces, which are the seat of the exudate, with every inspiration probably produced more or less local disinfection, apart from the systemic disinfection which it may cause by entering the blood and the tissues generally. Thus employed, the turpentine is also apparently a useful domiciliary disinfectant, affording protection in a measure to other members of the

[1]Centralbl F. Klin. Med.
[2]Therap. Monastchr.

family. The solvent agents heretofore most largely prescribed are combined in the following prescription:—

℞: Ol. eucalypti.....3ij
Sodium benzoat.....3j
Glycerine.....3ij
Sodium bicarbonate.....3ij
Aquæ calcis (lime-water).....oj
Mix.

To be used freely with the hand atomizer from three to five minutes every half hour, or with the steam-atomizer almost constantly. In very young children the throat may be mopped out, using a fresh mop in each application. Swab four or five times at each treatment, hence it will take as many fresh swabs at each treatment. This alkaline spray not only exerts a solvent action on the pseudo-membrane, but also renders the muco-pus thinner, less viscid, and therefore so changes its character by diminishing its viscidity that it is more easily expectorated.

Antitoxine Treatment.—In 1890, Behring and Kitasato published their first article upon the use of blood-serum of artificially-immunized animals in the treatment of diphtheria. After their third publication, in 1892, the subject attracted widespread attention, and became a matter of clinical investigation by Roux and others. Nevertheless, the chemical theory that the antitoxine directly neutralizes the toxine still has advocates. The antitoxine, as some authors state, has no direct bacteriological effects, although it arrests the spread of the local inflammation and the growth of the bacillus, probably by preventing the tissues from being so poisoned by the toxine that they are unable to resist the bacillus. It is proved that it requires a definite quantity of the antitoxine to neutralize the effects of a definite quality of toxine.

As it is said to be impossible to know how much toxine is present in a diphtheritic patient, the dose of antitoxine is uncertain and empirical; the older the patient, the longer the duration, and the greater the intensity of the disease, the larger the dose required. Certain untoward effects may follow its use; rarely a local abscess is formed, but diffused erythema, rheumatoid swelling of the joints, general uticaria, and albuminuria have been noticed in a number of cases,—effects sufficiently serious to make it wise to repeat the small or moderate dose of antitoxine if necessary, rather than in the beginning to give an overwhelming amount.

The unit of dose generally received is that of Behring, one cubic centimeter of so-called normal serum,[1] which is of such strength that one cubic centimeter will overcome ten times the minimum dose of diphtheritic poison fatal to a guinea-pig. The ordinary dose of the serum, which should be injected into the buttock, or flank, is 600 antitoxine units. If by the next day there has not been marked improvement, 1,000 units may be given. In very severe cases, or when the patient is not seen until late in the disease, from 1,000 to 2,000 units

may be administered at the first dose. In successful cases the effects of the serum are apparent within a few hours in the subsidence of the fever, the slowing of the pulse, and the reduction in the severity of the local symptoms. Inside of twenty-four hours the membrane should begin to disappear.

Although it is said that the exact power of the antitoxine treatment can hardly be considered to be determined, yet certainly its value has been so far proved that it should be used in every case of diphtheria with as much positiveness and determination as quinine would be employed in malaria. In the statistics collected by Welch, embracing many thousands of cases, the mortality was reduced by the use of the antitoxine about half. In the Paris hospitals from 1888 to 1889 the yearly average of deaths from diphtheria was 1,840. In 1890 there were 1,668 deaths; in 1891, 1,361; in 1892, 1,403; in 1893, 1,266; in 1894, 1,009; and in 1895, 435. The total death-rate thus fell after the introduction of the serum treatment to about one-fourth of what it had been for many years, and to one-third of the average for the previous five years. Although it is certain that serum treatment frequently fails, yet if some of the treatment is begun on the third or fourth day, the mortality is thirty-six per cent greater than in cases treated on the first or second day, and three and a quarter times less than in cases treated after the fourth day. In our opinion the sooner the practitioner begins the antitoxine treatment the better, that is, whenever a true feature of the case warrants the diagnosis of diphtheria, without waiting for the confirmation of this diagnosis by bacteriological methods. There is no reason for believing (as history states) that the antitoxine has any direct sedative influence upon the heart or irritative influence upon the kidneys, and certainly by arresting the diphtherial process it has a great tendency to prevent complications and secondary effects. In laryngeal diphtheria with stenosis, requiring operation, there is sufficient accumulated experience to show that the serum is a very valuable agent in preventing the progressive development of the false membrane in the false tubes, and that in many cases in which intubation would be otherwise insufficient, the antitoxine treatment does away with the necessity of tracheotomy. The value of antitoxine as an immunizing agent has not been chemically determined, although guinea-pigs may be rendered completely immune.

[1]The serum used that will supply 600 to 1,400 antitoxine units in a volume of 10 cc. is necessarily from sixty to one hundred and forty times as strong as normal serum. (Wood.)

CHAPTER XXXIV.

CAUSES OF EAR TROUBLES IN CHILDREN.

The commonest causes of aural diseases in children are acute exanthemata, acute and chronic catarrh of the nares and naso-pharynx, diphtheria, diseases of the heart, and hereditary syphilis; in older children, typhoid fever will cause ear trouble. Scarlet fever affects many more than do measles and diphtheria. Caries, or ulcerative ostitis (Schwartze), attacks the petrous bone most frequently of all the cranial bones. It is usually the result of an acute or chronic suppuration of the soft tissues of the ear which has extended to the adjacent bone. (Keating.) Caries of the temporal bone often heals without much loss of hearing if the labyrinth has escaped the attack; the fatal results of caries and necrosis usually are due to purulent meningitis, abscess of brain, phlebitis of the sinuses, with pyræmia, or to a combination of them all. (C. H. Burnett, M. D.)

INFLAMMATION AND ITS RESULTS.

Erythema, eczema, and intertrigo of the auricle are common in early childhood. Syphilitic lupus, pemphigus, and congenital ichthyosis are often seen in the auricle. Eczema, the most common affection of the skin, attacks the auricle, in both the acute and the chronic form. If allowed to become very chronic, it may permanently thicken and discolor the auricle. The matting of the hair about the auricle aggravates the disease; the hair should be cut close or shaven. This skin disease is often due to disorders in the child's digestion; but in most cases the disease is greatly aggravated by local irritation and scratching or rubbing from the patient's fingers.

Very often wearing a cap leads to maceration of the baby's auricle and the side of the head behind it.

Intertrigo, or chafing, is the first step, and then eczema. Even in this first stage, the parts should not be washed with soap and water, nor even with water alone. The parts affected may be smeared with bland sassafras or quince-seed mucilage, or sprinkled with a powder composed of equal parts of oxide of zinc and starch. The pellicle, or crust, which this forms with the secretions from the eczematous skin, should be allowed to remain, as it protects the inflamed skin and favors healing. If in the more chronic form the yellowish crusts of hardened serum get very thick, and must be removed, then soften with sweet-oil and gently remove them; but avoid this in the acute stage. In acute eczema the skin must be protected as in burns. It is char-

acterized by heat, burning, and tingling, with redness and œdema, which latter may be considerable where the skin is lax; shortly papillæ and vesicles, which may appear on the epidermis, may be stripped off, leaving a raw, exuded surface, or the process may remain erythematous to the end. If the eruption of the acute eczema is protected, or is not irritated, it tends to subside in a few days; but not completely, for the eruption lingers in a less acute condition, and is apt to pass into subacute eczema, which is a less inflammatory condition with a reddened itchy surface and moderate thickening. The diseased portions may be moist, tending to become scaly or crusted, or they may be hard and papular, exuding a glairy fluid when scratched.

A skin disease of the child's auricle must be treated with caution. The various applications to the diseased skin of the external ear must not be allowed to clog the external auditory canal nor to run down upon the drum membrane.

Boxing the ears, pulling the ears, and swabbing the canal for imaginary wax and dirt must be most carefully avoided. Boxing the ears is apt to produce rupture of the drum membrane, by the force of the column of air driven suddenly against it.

Pulling the ears is nearly as injurious as "boxing" them, since the attachments of the auricle to the auditory canal are of such a nature that traction upon them is communicated to the sensitive fundus of the canal, and even to the membrana tympani. Hence pain and injury are often the result of this rude manipulation of the ear. (Sexton and Pinkerton.)

FOREIGN BODIES IN THE EAR.

This is a subject of great importance to general practitioners, as they are usually called first to see the child who has something in the ear; *and afterwards* the specialist's aid is invoked.

Let it be written at the outset in most emphatic language that the mere entrance of a foreign substance into the ear is, in itself, of very little importance. In no case has injury to the child ever arisen from the mere presence of a foreign substance, like a bead, a seed, or a button, in its ear. It is the unskilful, rough, and lacerating efforts made for its removal which has invariably produced the real injury. (C. H. Burnett.)

No one but an aurist of experience should ever touch an ear with any kind of metallic instrument, even of the most delicate and special form. If there is a small bead or seed in the ear, a few syringefuls of warm water will bring out the foreign substance.

When roaches, fleas, or insects of any kind get into the ear, a few drops of sweet-oil or linseed-oil will smother them, and relieve the suffering caused by their movements. Wash or syringe the ear with warm water in all cases of foreign substances entering into the ear.

I have known instances of maggots getting into the ears of children affected with otorrhœa. If such an accident occurs, a drop or two of chloroform or ether will destroy a maggot's life instantly, whereas syringing the ear with warm water only makes the maggots more lively, and pain in the ear more intense. Wax rarely accumulates in plugs in a child's ear to such an extent as to interfere with hearing. Syringing with warm water is all that is required for its removal.

Accumulations of wax in the ear may be softened by using five or ten drops of the following:—

℞: Soda bicarb.....gr. xx
Glycerine.....ʒj
Water.....ʒviii
Mix.

Apply warm to the ear. A dropper may be used for applying it. Now and then these accumulations are found in the ears of children from five to ten years old,—hard, leathery, or horny plugs, composed of epithelium with a little cerumen in the outer end, near the meatus. These plugs quite fill the canal, and render the ear totally deaf. Their removal is tedious, and can be accomplished only after continued use of the above-named solvent drops and patient syringing.

Syringing the Ear.—In syringing the ear of an adult or a child, but especially an infant, the nozzle of the syringe must be larger than the meatus of the ear, in order to prevent the entrance of the instrument into the canal. The ear syringes made with a nipple-like prolongation of the nozzle are dangerous to use, as they can be made to enter the meatus half an inch or more, and can reach and wound the membrana tympani. The ordinary hard-rubber enema syringe is within reach of all, and is a safe syringe to use. With it an ounce or two of warm water may be thrown into an infant's or a young child's ear, and the return current caught on a towel held closely under the ear. If the accumulation of wax can not thus be removed, a specialist should see the child,—the best specialist, or one qualified to treat it. All fungus growths, as aspergillus, a variety of mould, may grow in the fundus of the ear upon the membrana tympani underneath the accumulation of wax; such cases should have early attention. A powder composed of salicylate of chinoline, one to sixteen parts of boric acid, blown into the ear after the wax is removed, will destroy the aspergillus. One application is usually enough.

OTITIS EXTERNA DIFFUSA.

This name is applied to the diffuse inflammation attacking the skin of the auditory canal as a result of the irritation arising from the ingress of improper medicaments, cold air, or cold water, from picking and swabbing the ear, or the continued presence of the fungus aspergillus. Direct violence, such as putting snow into the ear in rude play, blowing into the ear, or subjecting the child to sudden changes of tem-

perature, is accountable for this disease in many cases. It is a very painful affection; and its tendency to involve the subcutaneous tissues and even the periosteal lining of the osseous part of the auditory canal, causes it to assume very often all the features of a periostitis.

The skin rapidly becomes red and swollen, and, from its confined position in a cartilaginous and osseous canal, is thrown into several thick folds or ridges, which, uniting in the center of the canal, soon obstruct all view of the drumhead, and render the patient hard of hearing. Tinnitus is also complained of, as well as intense pain. Several days usually elapse with all these painful annoyances to the patient, before secretion sets in. Then the skin often exudes, at first from several points, a bloody serum discharges, followed in a day or two by one purulent in character. The quantity of serum discharged in such cases is often very copious, wetting a number of towels or cloths in the course of twenty-four hours. Sometimes the inflammation may extend to the membrana tympani, and involve it, so that perforation ensues and mucus is found in the discharges of the ear.

Treatment.—In the first stages, the treatment is surgical. While the skin of the canal is swollen and tender, the best treatment is to make one or two deep incisions, down to the bone if necessary, into the congested skin. This will often cut short the disease; but the method is painful. The next best means of relief is to apply a dossil of cotton moistened with the following mixture:—

℞: Black wash.....f℥j
Glycerine.....f℥j

Or a fifteen per cent solution of ichthyol in water may be used. This application will abort the circumscribed furuncles and the diffuse form of otitis externa. If, however, suppuration is fully established, the ear must be gently syringed with weak salt and water, warmed, or with boric-acid solution, or with a two-per-cent solution of carbolic acid, or with plain warm water, then gently mopped with absorbent cotton; and, if the acute stage has fully passed, and the ear is no longer sensitive to touch, boric acid in fine powder, or boric acid seven parts and iodoform one part, may be insufflated. If the ear is thus cleansed once or twice daily while the discharge is copious, and then once a day or every second day as the discharge diminishes, the organ will soon heal. But all fats, oils, vegetable matter, and poultices must be kept away from the ear, at this time and at all others, as they produce breakdown and sloughing of the fundus of the canal. (C. H. Burnett, M. D.)

CHAPTER XXXV.

MEASLES.

Synonyms.—Rubeola, marbilli.

Definition.—Measles is an acute, epidemic, contagious disease, characterized by a peculiar papular eruption, occurring usually on the fourth day of the attack, preceded by catarrhal symptoms and followed by slight desquamation.

History.—This disease was described with smallpox by Rhazer, A. D. 900, who undoubtedly recognized the difference between them. Before that date we have no authentic account of the disease. It continued to be confused with scarlatina and smallpox until 1670-74, when Sydenham and Morton declared the former to be a distinct disease. Where civilization has not penetrated, the disease is unknown.

Etiology.—Measles is due to a specific poison that has not yet been isolated. It is both epidemic and contagious. All authorities agree that it can not originate *de novo*.

That it is epidemic is manifest from the fact that the disease is far more common during certain seasons or years than others. A community may be comparatively free from the disease for a time, when at length it will sweep over it like a cyclone, and but few will escape. A period of immunity will then prevail, lasting for a longer or a shorter time, when it will again make its appearance.

That it is highly contagious no argument is needed to prove. It ranks with smallpox in this particular. The contagiousness begins with the catarrhal symptoms and continues until after desquamation. The contagious principle exists in the breath, the exhalations from the skin, the blood, the tears, the nasal and bronchial secretions, and in the urine and fecal discharges. The poison of the disease gains access to the system in the great majority of cases through the mucous membrane and the respiratory tract, the inspired air carrying the active contagious principle. The disease is equally prevalent in both sexes.

Symptoms.—The period of incubation is about ten days, at the end of which time an abrupt rise of temperature to 102 degrees or 103 degrees Fahrenheit, the first day, with or without chill, occurs, and characteristic catarrhal symptoms appear. There are pains in the head, back, and limbs, loss of appetite, and malaise. The conjunctiva becomes red and watery; there is frequent sneezing, with excessive nasal secretion, and nosebleed not rarely; laryngitis, tracheitis, and inflammation of the bronchial tubes frequently give rise to a troublesome cough. Sometimes the cough is croupy, and the respiration

embarrassed from the swelling of the mucous membrane of the larynx. Occasionally alarming symptoms result from edema of the glottis. The throat is sometimes a little sore, but never as it is in scarlet fever. In many cases during the invasion, the hard and soft palates and the throat itself are very red and covered with minute spots or points, which are sometimes spoken of as an eruption upon the mucous membrane. Diarrhea occurs in a small proportion of cases, convulsions rarely. The fever that may have preceded the catarrhal symptoms increases in intensity with the development of these symptoms, and the temperature usually ranges from 102 degrees to 104 degrees Fahrenheit.

Stage of Eruption.—About the fourth day, when the catarrhal symptoms have reached their height, is usually marked by the development of the eruption, which first appears upon the forehead, temples, and cheeks, and around the mouth, soon extending to the face, breast, extremities, and trunk. It appears at first in the form of minute red spots; these rapidly increase in size and number, and become distinctly papillar and perceptible to the touch. When fully developed, the eruption is of a dark-red color, and in many cases is surrounded by areas of skin of normal color; but on certain portions of the body, especially the face, neck, and fore-arms, they are confluent, and these portions present a peculiar blotched and swollen appearance. Under the pressure of the finger they lose their color, but it returns again immediately upon removal of the finger. In from thirty-six to forty-eight hours, in favorable cases, all the symptoms begin to decline, and in from three to six days the fever has disappeared, desquamation has commenced upon the face, and a rapid convalescence has been entered upon. In other cases, although the eruption rapidly fades and the fever subsides, yet a bronchitis remains for some days, and is the last symptom to disappear. As soon as the active symptoms disappear, the appetite and natural disposition of the child return, and the patient is soon in ordinary health.

There is also an abortive form of the disease in which the eruption appears with the ordinary symptoms, but fades away immediately, with a rapid abatement of the fever and a well-developed convalescence by the fifth day of the disease. These cases are at once differentiated from those in which there is a sudden retrocession of the eruption by the immediate abatement of the constitutional symptoms.

Among the malignant forms of measles are those cases in which the disease is complicated with some other serious illness, as in case of tuberculosis, typhoid fever, diphtheria, or scarlet fever. The disease is frequently irregular under these circumstances; the eruption is imperfectly developed, the fever high, and the complications excessive. A form of measles which has been seen in the army and in children's asylums, is that in which in the beginning there is violent dyspnœa with marked cyanosis and usually rapid death from asphyxia. In many of the cases will be found fine disseminated rales of a capil-

lary bronchitis; but sometimes the only departure from the normal to be made out is extreme feebleness of the respiratory movements. It is to this variety of measles that the name of *epidemic capillary bronchitis* has been given.

In the adynamic form of measles the severe symptoms usually develop at the time of the appearance of the eruption. The pulse becomes very rapid, the respiration exceedingly hurried, and the temperature rises to 104 degrees or 105 degrees Fahrenheit. The tongue is dry, and typhoid face, great muscular prostration, and other symptoms of the typhoid state rapidly develop. In young children, repeated convulsions are frequent, and often end in coma. In adults, delirium, mild and muttering or fierce and maniacal, comes on. Death in such cases may occur in three or four days; or with the development of natural sleep, and a great increase in the secretion of urine, the violence of the symptoms may abate. In some of these the disappearance of the eruption is sudden, with a great increase of the symptoms. "Black measles" is a rare form, with hemorrhage under the skin and the mucous membrane, and is usually fatal.

Complications.—The most common complications of measles are the inflammations of the mucous membranes. These inflammations exist to a greater or less extent during the natural course of the disease, and are not properly complications unless so intensified as to give rise to graver or dangerous symptoms. Violent nasal catarrh may give rise to a serious otitis media; laryngitis with swelling may produce laryngeal obstructions; while actual membranous exudation is not very rare in the throat and larynx, and may be associated with the diphtheritic bacillus. Bronchitis is a very common complication, is almost universal, and is especially prone to pass into the smaller tubes and produce a capillary bronchitis, followed by infiltrated patches throughout the lungs, which, by their confluence, may produce widespread pneumonia. Broncho-pneumonia occurs. The pulmonary complications may develop at any period of the disease, but are more frequent and severe during the stage of the eruption and also during convalescence. A rapid respiration and dyspnœa, with increased fever, are their characteristic marks. When severe pulmonary complications occur in young children, the dyspnœa is extreme, and convulsions are not uncommon; death from suffocation may occur during the second or third day.

In healthy subjects the conjunctivitis rarely ends in suppuration or any serious trouble. In delicate children suppurative conjunctivitis, diffused purulent keratitis, and ulceration of the cornea are especially common.

Stomatitis is a common complication, varying greatly in severity. It may range from a simple inflammation to ulceration, or even to cancrum oris. Gangrenous inflammation of the mouth, however, more frequently appears as a sequel than as a complication.

Diagnosis.—During the stage of invasion it is difficult to distinguish measles from a severe attack of coryza or bronchial catarrh. Known exposure to the disease would be the strongest evidence of its real character. After the appearance of the eruption, we may confuse the disease with rubella, or German measles, scarlet fever, variola, varicella, or typhus fever.

In rubella the catarrhal symptoms are slight, and the eruption appears within twelve to twenty-four hours after the invasion. The patient is not considered sick until the eruption is discovered. The temperature does not run high, the pulse is less rapid, and the disease runs a shorter and milder course.

The differential diagnosis between measles and scarlet fever is based upon a shorter period of invasion in scarlet fever, the presence of sore throat, the absence of catarrhal symptoms, and the difference in the appearance of the eruption.

Measles is undoubtedly more frequently confused with variola than with any other disease. These are catarrhal symptoms in variola, but not so marked as in measles. During the first twenty-four hours of smallpox the eruption often resembles very closely that of measles; but if there is any uncertainty, a delay of a few hours will usually make the diagnosis clear. A very important consideration in the differential diagnosis is the fact that in case of smallpox (variola) with the appearance of the eruption all the active symptoms abate. The pain in the back, the head, the high fever, all disappear, but not so in measles. In variola the eruption soon becomes more markedly papillar, presenting a *shotty* feeling when the hand is passed over the surface. In the course of the disease the papillæ become vesicles, and then pustules. In measles the eruption remains papillar throughout the whole course, and these papillæ are slightly elevated above the surface.

Prognosis.—The prognosis will depend greatly upon the previous state of health of the patient, the surroundings, and the care and attention the patient will receive. Careful nursing is highly important during the entire course of the disease, and during the convalescing stage care must be taken to avoid exposure to cold. In some epidemics the death-rate of measles is much higher than in others, and the tendency to fatal complications much greater. The prognosis is favorable in those cases that pursue an even and regular course; but all cases of great severity bordering upon malignancy, or that pursue an irregular course, or that develop complications, should be most carefully guarded. The development of diphtheritic pharyngitis adds greatly to the danger, and the prognosis is generally unfavorable. Race is a characteristic of importance. Death is said to be much more frequent among the negroes than among the whites. In North America, South Africa, and Oceanica, half the population of a whole district has died in the course of a few weeks.

The continuance of high fever after the disappearance of the eruption is generally an unfavorable indication, denoting, as it does, the presence of some complication.

Treatment.—The treatment of measles should be preventive, hygienic, and therapeutic.

Preventive treatment refers to prompt isolation of the patient on the first occurrence of the *catarrhal* symptoms, thorough disinfection of the apartments and all clothing, and the use of antiseptics applied to the body of the patient in the form of ointments. In cases of known exposure the well children who have not been exposed may be sent away from home, or the patient may be kept in some distant room in the house. The attendant should not mingle with the family without disinfecting herself and changing her clothing. (See Typhoid Fever.) During the illness antiseptic solutions may be applied to the body of the patient two or three times daily, thus preventing the diffusion of the poison. Carbolized oil and cold cream or vaseline with carbolic acid may be employed.

The hygienic treatment is of great importance in measles. The patient should be placed in a large, well-ventilated room, which should be shaded from bright light, *but not completely darkened*, and the temperature of the room should be uniform. The covering should not be *too* heavy, but light and comfortable, and an abundance of water should be given when the patient is thirsty. It is a mistake, too frequently made, to bundle a child up in heavy blankets and give nothing but hot drinks. When the eruption is tardy, a warm bath and an occasional drink of hot lemonade may be useful. Little food except milk is required, especially the first few days, and other foods that are given should be such as can be easily digested.

As to therapeutic treatment in an ordinary attack of measles very little medication is required other than the hygienic measures referred to above. There is no specific known remedy that will cut short the disease. **The conjunctiva should be washed** with boracic-acid solution three or four times a day, or as often as indications require it. The boracic solution may also be used in spraying or cleansing out the nose, and the throat gargled with a solution of chlorate of potash several times a day. Keep the bowels open with some mild laxative. Diarrhea should not be interfered with so long as it is only slight in degree; if it is excessive, give bismuth subnitrate in five-grain doses, according to age. If the eruption is delayed, a mustard hot bath, two teaspoonfuls of mustard to a gallon of water, or a hot mustard foot-bath should be used. A sudden rise of the temperature, or even a very high temperature gradually attained, almost invariably indicated the coming on of bronchial or pneumonic irritation, and calls, therefore, for counter-irritation and the appropriate treatment for bronchial or pneumonic symptoms. A temporary elevation is not considered grave; but if the fever continues of a severe pyrexia (103 degrees Fahrenheit), it is dangerous, and must be met

by the use of external cold or of antipyretics. Phenacetine ranks first as being the best antipyretic, and antipyrine next. In no cases should large doses be given of either of these remedies. It is safer to reduce the temperature to 90 degrees Fahrenheit, which, if necessary, may be gradually cooled further, even as low as 80 degrees Fahrenheit. After removal from the bath (of from five to seven minutes) the patient should be rapidly dried, and if there be any failure of vitality, whisky should be given.

Some soothing expectorant cough mixture is essential, alternating with small doses of quinine. Small doses of ipecac may be given with potassium citrate, but stimulants and expectorants, such as ammonium chloride, terebene, or oil of eucalyptus, are soon demanded in all pulmonic complications of measles. Extract of ergot is recommended in reducing the congestion; and the free use of hot flaxseed poultices over the chest is of the utmost value. In cases of malignant measles, free stimulation has to be used from the beginning of the disease. Milk, eggs, and brandy, and beef juice are essential. If a patient is too weak to take a bath, sponge the patient once or twice a day, and thoroughly dry the skin to keep up its functional activity. It should be insisted that flannel be worn, however light in weight; if it irritates, a fine linen garment can be worn underneath the flannel. Especially should the chest, abdomen, and feet be protected against the cold. The same care should be given as during convalescence from scarlet fever.

CHAPTER XXXVI.

RUBELLA (ROTHELU), GERMAN MEASLES.

Definition.—This is a specific, contagious, febrile disease, characterized by mild catarrh, and an eruption simulating measles; it occurs independently of the existence of measles or scarlet fever, and possesses characteristic symptoms in its incubation, invasion, eruption, and period of duration. Furthermore, it will reproduce itself only in those parts exposed to its contagion. One attack usually protects from subsequent invasion, but will not afford immunity from either measles or scarlatina. Children are most susceptible. The prodromal symptoms are enlargement and induration of the cervical, submaxillary, auricular, and the suboccipital glands. At times other glands are affected; but suppuration never occurs.

Etiology.—Rothelu, or rubella, although long confounded with other exanthematous diseases, is without doubt a distinct disease and directly *contagious.* It occurs, as a rule, most usually in epidemics, and is due to an unknown contagium, which is capable of being transferred in fomites, clothing, etc., and is given off from cutaneous exhalations and from the breath of the patient from the period of invasion to well-advanced convalescence.

Symptoms.—The invasion period of rubella is short, and marked only by slight fever, malaise, nervous disturbances, and some conjunctival catarrh. This stage of incubation is most difficult to decide positively, as symptoms are almost entirely absent in many cases during this time. This stage may be from seven to twenty-one days. The average, however, is said to be about fifteen or sixteen days. "Griffith considers this varying period of incubation to be of diagnostic value, thus differentiating from the fixed period of the measles." The eruption is said to be especially prone to develop during the night, and in more or less erratic ways. It may appear first on the face or upon the body all at once, or on the inner side of the arms, etc. Griffith notes symptoms recorded as follows: "Chilliness, languor, faintness, headache more or less severe, pain in the back and limbs, coryza, red and watery eyes, sore throat, cough, and occasionally a hoarse, husky voice. As illustrating the more severe symptoms of some of the first one hundred cases, we note a rise of temperature during this period. Many of the patients did not show a higher registration of temperature than 100 degrees Fahrenheit, and varied from this point to 103 degrees Fahrenheit; nausea and vomiting, delirium and convulsions, and epistaxis in three cases." Other observers have

noted marked prodromal symptoms during the stage of invasion. Two cases of hemorrhage of eyes and ears have been recorded by Priolean; convulsions, by Smith and others; delirium, by Hardaway and Cuomo; uticaria, by Cullingworth in four cases; rigors, by Nymann, and dizziness, by Squire; Mettenheimer notes fainting, and Balfour a croupy condition; Earle, Kingsley, and Thierfelder report prodromal rash; Cuomo, an erythema preceding the specific rash.

Elevation of the rash above the skin has also been noted. It is more or less polymorphous in color, size, and form, as well as in dissemination. Upon the trunk and especially upon places where there is continuous pressure, the spots may become confluent, while upon the hands and feet they are usually discrete. The eruption spreads rapidly, reaching commonly its full efflorescence and beginning to fade in from twenty-four to thirty-six hours, and disappearing entirely without desquamation in three days. Its color ranges from a pale rose to a deep red; and while it varies greatly in its minute appearances, there are two typical forms,—one in which the spots are minutely papular, like measles, and one in which they are large, reddish plaques, suggesting scarlet fever.

Usually there are no complications, and the cases pass rapidly to recovery. There is said to be a malignant form of the disease. Kronenberg, quoted by Llaasch, reports four deaths from bronchitis, pneumonia, and cerebral congestion after rubella.

Diagnosis.—We have no diagnostic guide that can be considered positively characteristic, or pathognomonic symptoms by which we would isolate a single individual case of rubella. It is said that the eruption of rubella, or German measles, may exist without the enlargement of the lymphatic glands, and the enlargement of the lymphatic glands without the eruption. In such cases known exposure to the disease would be the means of determining a diagnosis. In our experience the only affection which the disease resembles is measles, from which it is believed to be separated especially by the lymphatic enlargement and tenderness, as well as by the mildness of the catarrh and of the general symptoms, and by the polymorphic character of the eruption.

Treatment.—Rarely is other treatment required than simple nursing. Treat on general principles any symptoms which may arise, and should be met. Particular care must be taken that the patient is not exposed to a draught, or sudden chilling of the cutaneous circulation. This must be our endeavor until all danger of complication has passed away. A large, airy room is required, with a temperature of about 68 to 70 degrees Fahrenheit. A teakettle boiling on the stove in an adjoining room for the admission of steam to the room occupied by the patient, where there is a harassing cough, affords comfort to the patient.

As in all the other eruptive fevers, the treatment at the onset should be expectant. Very little, if any, medical treatment is required. Put the child to bed in a well-ventilated but somewhat darkened room, with

all noise and unnecessary visiting prohibited. The little patient should be allowed to drink freely, if there is much thirst, milk well diluted with lime water, barley water, or lithia water, whey, or weak lemon or orange water flavored with glycerine. An occasional cup of tea made very weak, for flavoring a cup of hot milk and water, will frequently be of great advantage in bringing out the eruption. If there is headache, the head can be kept cool by cloths wrung out of camphor water, and a hot foot-bath, with a little mustard in the water, may be administered. Should the child be restless, sweet spirits of nitre forms undoubtedly the best sedative, and may be given with sweetened water or added to the lemonade. Should the skin be dry and the child delirious, a hot bath may be administered. A fever mixture may be given at intervals, such as the following:—

℞: Tinc. aconite rad ..... ℥j
Spirits ætheris nitrosi. ..... ʒss
Lig. ammon acetatis, q. s. ad..... ʒij
Mix.

Dessert-spoonful every two hours, as needed.

Give a dessertspoonful every two hours or oftener, as required, to a child five to ten years old.

Should there be a tendency to intestinal catarrh more or less severe, the symptoms should be carefully watched, and, when treatment is indicated, small and repeated doses of Dover's powder and calomel, or calomel and bismuth and pepsin, may be administered.

℞: Hydrarg. chlor. mitis.....gr. ss
Pulv. Doveri..... .....gr. vi
Pulv. aromat.....gr. vi
M. ft. chart., No. vi.

Sig.: One to be given to a child every hour or every two hours, as required for a child one year old: or the following may be used for catarrh of the intestinal tract:—

℞: Hydrarg. chlor. mitis.. .....gr. j
Bismuth subcarb.....grs. xii
Pepsini sacch ....grs. xxiv
M. ft. chart., No. xii.

Sig.: One powder to be given every two hours.

The diet should receive careful supervision and be graded to the requirements of each case. Mild aperient mixtures should be ordered for the bowels as indicated, and the lungs carefully examined daily. As soon as a sense of oppression or tightness about the chest is complained of, hot poultices or fomentations should be applied. If a case is considered serious, a mixture of equal parts of chloroform and tincture of aconite root may be painted over the chest and lungs. When the cough becomes troublesome, it should be treated by the usual expectorant mixture. The following has proven beneficial for cough:—

℞: Ammoniæ muriat.....ʒj
Vin. ipecac.....fl ʒij
Tinctura opii camph.....fl ʒijss
Syr. senegæ. .....fl ʒvi
Aquæ q. s. ad.....fl ℥iv
Mix.

A teaspoonful every two or three hours for cough. All patients presenting laryngeal complications must be subjected to constant steam inhalations, together with the applications of heat and moisture externally over the larynx. Many cases will require, in addition, a general stimulating treatment, such as digitalis, carbolate of ammonium, wine or brandy, and liberal fluid nourishment frequently administered. An oleaginous preparation should be applied to the skin during the stage of eruption and desquamation, if there be any. It allays itching in the eruptive stage, and aids in the reduction of the temperature, and also in the prevention of contagion, as it may be by these fine scales that the contagion is carried. Either olive-oil, cocoa butter, or cold cream is beneficial for this purpose.

Complications are to be treated as they arise. During convalescence much care should be used in guarding against colds. The child should be placed on tonics, such as quinine, iron, and cod-liver oil. Wampole's cod-liver oil for children has proven very useful in the writer's hands.

Suitable clothing must be insisted upon, with flannel next to the skin.

CHAPTER XXXVII.

VARICELLA (CHICKENPOX).

Definition.—Chickenpox is an acute, specific, infectious disease peculiar to infancy and childhood, characterized by a short febrile period and a vesicular eruption distributed over the whole surface of the body. The vesicles appear in successive crops, and disappear by desiccation in from three to five days, occasionally leaving permanent cicatrices.

Etiology.—Varicella is a disease of infancy and childhood. Infants under the age of six months enjoy a certain immunity, but it is not so marked as in the case of scarlatina and measles. Various organisms have been isolated from lymph of the vesicles of chickenpox, and Bareggi asserts that "he has discovered an ovoid micrococcus which exists in the white blood-corpuscles, and whose cultures are capable of producing varicella in infants;" "whilst Pfeiffer has found an amœba-like parasite in the vesicular lymph." Varicella is certainly distinct from all other diseases, and is entirely incapable of protecting from smallpox or other affections.

Symptoms.—Varicella has a period of incubation from ten to fifteen days (and is more variable in this respect than variola or measles), followed by a period of invasion which in most of Steiner's inoculation experiments lasted four days, but which in the natural disease is ordinarily much shorter. The onset of the disease is first made known usually by the appearance of the characteristic rash. Mothers will rarely have their attention called to any symptoms preceding the eruption, and it is very seldom that the physician is called until the formation of the vesicles is well under way.

The eruption of the varicella generally appears first upon the upper half of the body, as upon the chest or upper part of the back. From the place where the eruption begins, it spreads rapidly over the body, face, hairy scalp, and extremities. The rash is most abundant upon the face, or upon the forehead and near the temples. The vesicles are brilliant, surrounded by a reddish areola, and varying in size from a tenth to a quarter of an inch. Especially when scratched by the child, they may leave distinct ugly scars. Fresh groups of the eruption may appear for several days, so that various stages of the pock coexist side by side. In cachectic cases the varicellar eruption is often purpuric, and may be ecchymotic; even gangrenous ulcers sometimes result. During the eruptive stage there is generally a mild fever, with the usual symptoms of that condition. The fever may be ushered in with

a slight chill or chilly sensations. The rise of temperature is rarely above 101 or 102 degrees Fahrenheit. The fever is remittent in type, with evening exacerbations; or the morning temperature may be normal, and a slight rise occur towards evening. Occasionally the fever may run high. Thomas reports a case in which it rose to 106.8 degrees Fahrenheit, but quickly fell. The febrile period continues for two or three days, or in cases of successive crops of the eruption, the fever may continue longer.

Very rarely the throat may be a little sore. The duration of the disease from the initial symptoms to the last falling off of the crusts is eight or ten days.

In healthy children the disease does not show much variation in type.

Mr. J. Hutchinson was the first to describe the dangerous form of the disease. Hutchinson states: "It is not confined to weakly, ill-nourished children, but is most common in them. It is no doubt connected with the curious tendency to spontaneous gangrene sometimes met with in other children."

In gangrenous varicella the vesicles, it is said, instead of drying up in the ordinary way, become black and get larger, so that a number of rounded scabs, with a diameter of half an inch to an inch, are scattered over the surface of the body. If a scab be removed, it is seen to cover a deep ulcer; around it the skin is of a dusky-red color. All the vesicles do not take on the gangrenous action, so that we may find many varicellous scabs of ordinary appearance mixed up with the blackened crusts. "The gangrenous process often penetrates deeply through the skin to the muscles, but under some of the scabs the ulceration is more shallow. These cases are very fatal." (J. Hutchinson.) Mr. Warrington Howard reported the case of a baby twelve months old, who weighed only six pounds and a half. The child was attacked with gangrenous varicella, and died in two days of pyæmia, with secondary abscesses of the lungs.[1] According to Dr. Crocker, gangrenous eruption does not always appear to come from the varicellous eruption, but occurs in parts not the seat of the varicellous rash. (London *Lancet,* May 30, 1885.) Hutchinson states that loss of sight may result, in these cases, from purulent erido-choroditis.

Complications.—Varicella has no complications that are directly dependent upon it.

Various diseases, however, have at times been noted accompanying it. Among those that have been recorded are erysipelas, otitis, and peritonitis. Measles and scarlatina have been reported in this country.

Sequelae.—Not infrequently after varicella an anæmic condition is left, which may continue, unless properly treated, for some time. Nephritis, pneumonia, pleurisy, and abscesses have been recorded.

Diagnosis.—Special interest is attached, in the diagnosis of vari-

[1] "Disease in Children," p. 49, Eustace Smith, New York, 1884.

cella, to its clinical separation from variola and varioloid. The prompt recognition of the benign character of the disease is of great importance, both to the patient and to the community, as failure on the part of the physician to make a correct diagnosis may either subject a patient to an isolation made doubly disastrous by exposure to the infected air of a smallpox pest-house or hospital, or expose a community to the danger of widespread infection from various subjects. Either mistake is a grave one, and certainly would involve the physician in its disastrous results.

Varicella can usually be distinguished from varioloid without difficulty by the absence of serious prodromic symptoms.

1. The age of the patient attacked by the disease.

As we know, smallpox attacks all persons, regardless of age.

Varicella, or chickenpox, is particularly a disease of infancy and early childhood.

2. The short period of invasions.

The eruption of varicella is not, as a rule, preceded by a distinct period of invasion; the appearance of the rash is the first indication of ill health that the child manifests. When an invasion period is present, the symptoms are of an ill-defined character, and rarely continue more than one day. The invasion period of variola is three days in duration, and is marked by characteristic symptoms. Variola, or smallpox, is ushered in by a chill, which is quickly followed by high fever, vomiting, and intense headache and backache. These symptoms are never met with in varicella. Even a very mild case of varioloid presents a distinct and moderately severe period of invasion. Occasionally, however, it is hardly noticeable.

3. The superficial and vesicular character of the cutaneous lesion.

The varicella pocks are more bulb-like (and the papules do not have a hard, shotty feeling like those of smallpox), and also the areolation around the blebs of varicella is not so deep. When the pock of varicella becomes confluent, and in some places umbilicated, the diagnosis may for a time be very difficult. Acute pemphigus, varicelliform syphilides, and certain other skin affections, as bullæ, occasionally closely resemble varicella, but are usually distinguished without difficulty by being apyretic, or by the slow development of the vesicles.

In varicella a small vesicle quickly forms in the center of the papillæ, remains a vesicle filled with clear or opalescent fluid for twenty-four or forty-eight hours, and then dries into a light, easily-detached crust. The variolous eruption passes through a distinct papular stage, lasting three or four days. The papules of smallpox are well developed, raised markedly above the skin level, and by the diagnostic hard, shotty character of the base are shown to be situated deep in the cutis vesa. The papules become vesicular on the sixth or seventh day, and by the ninth day the vesicles are transformed into umbilicated pustules.

Prognosis.—The prognosis is always favorable, and the profession and laity look upon it as a trifling disorder.

Treatment.—Commonly no prophylactic treatment of varicella by isolation of the affected person is necessary, although enfeebled children should not be exposed to the disease.

The child with varicella should be kept quietly in bed, during the febrile period, and the indications of the fever met as occasion demands. Rarely is any treatment demanded other than quiet and light, nutritious food, and the proper regulation of the temperature of the room.

The lesions upon the face should be carefully watched, to prevent scars; keep the face anointed with some bland oil, as olive-oil or cocoanut-oil.

The vesicles upon the face should be punctured, and cleaned with a mild antiseptic lotion, such as boracic-acid solution. This will favor their rapid recovery.

The continued anæmic condition resulting from an attack of varicella should be met with an alterative for the blood, as syrup of the iodide of iron, and a bitter tonic; and in children in whom there is left a tendency to cutaneous eruptions, attended by glandular enlargements, a course of cod-liver oil (Wampole's) is very serviceable in building up the constitution. A careful regulation of the diet is of much importance.

CHAPTER XXXVIII.

VARIOLA (SMALLPOX).

Definition.—Variola is an acute contagious fever, characterized by an eruption, whose unit is at first a hard papilla, then an umbilicated vesicle, then a pustule, and finally a crust. In the great majority of cases one attack destroys the susceptibility to subsequent contagion.

Etiology.—The cause of smallpox is a contagium, which, it is thought, is probably an organism. Late in the disorder secondary septic infection is prone to occur, so that, according to the history of cases, various species of staphylococcus, streptococcus, and even a saccharomyces, have been found in different portions of the body. The nature of the original virulent organism still remains doubtful. "Klebs has described a tetracoccus, whilst Pfieffer and Vander-Coeff affirm that there is a sporozoon for the transmission of the contagium, and contact is not necessary. The fact that the crusts, which in China are preserved for the purposes of inoculation, retain their activity for two years, shows how tenacious of life the germ is, and the form of fomites which suffices to retain the germ." (Wood.)

Of the first origin of smallpox we have no knowledge. It is very readily conveyed through the air. According to recent opinion it may be communicated in this way to great distances, especially from smallpox hospitals. (Power.) The contagium appears to be of a very clinging nature; clothing, bedding material, and such like attainted by the secretions or exhalations of the body retain it in an active condition for a long time, and, unless they are very carefully disinfected, they may become the means of propagating the disease months, or even years, afterward. It is liable also to be spread by persons so slightly affected by the disease that its true nature is overlooked, and they are allowed to attend to their daily business and to associate with others. In children also cases have occurred of so mild a nature that no eruption appeared; yet they were the means of communicating the distinct disease to others. (Collie.) Physicians and nurses are liable to carry it to another; therefore extreme care should be exercised to prevent the spread of the disease in that manner. The contagium chiefly finds entrance into the system through the respiratory organs, and there is much evidence to show great resistive power in the digestive organs. The disease certainly exists in enormous quantities in the pustules and scabs; but it may escape from the body with all the excretions, and is abundantly given off during the stage of invasion before the appearance of the eruption.

It is said that the contagion is most active when the pus formation is most abundant. It attacks all ages and both sexes. Very few persons, unless protected by previous attacks, are insusceptible to the poison, though there appear to be certain families in which there is a distinct hereditary immunity. In all probability the parents of such immunes had smallpox; hence their offspring would not be so susceptible to the disease. Certain races, notably the negroes, seem to be more susceptible than others; but the statement that has been made that other races, such as the Hindoos and Australians, are insusceptible, is said to be incorrect. (Wood.)

Pathology and Pathological Anatomy.—Our present knowledge, according to the various authors, does not warrant any definite statement as to the exact nature of the contagium, for, so far, it has baffled the researches of the most careful investigators. The skin presents the remains of an eruption, either as crusts, pustules, or ulcers, which, in hemorrhagic cases, are infiltrated with blood. Similar lesions to those found on the skin, but not so typical, are found in the mucous membranes, principally on those which are exposed to the air. The mouth, pharynx, nares, larynx, and trachea are the most frequently affected; but in severe cases pustules are found in the œsophagus, bronchi, and air passages, in the rectum near the anus, in the vulva, in the vagina, and often in the urethra close to the orifice. "The blood in fatal cases is dark and coagulates imperfectly." "The dependent portions of the lungs are often collapsed, injected, and œdematous, and patches of lobular pneumonia or broncho-pneumonia are frequent. The heart is flaccid, of a pale gray color, from granular degeneration of its muscular fibers. The liver and kidneys also show evidences of parenchymatous degeneration, and the spleen is enlarged and soft from acute hyperplasia." Minute necrotic foci have been found by Weigert and Bowen in the liver, spleen, lungs, and lymphatic glands. "Septicæmia and pyæmia, associated with metastasis abscesses, are frequent causes of death in the later stages of the disease. Gangrene of the vulva is occasionally seen. Post-mortem examination reveals large and small hemorrhages into many of the viscera, ecchymosis under the serous membranes on the surface of the brain, heart, lungs, liver, and kidneys, and extravasations into many of the mucous membranes." (A. D. Blackader, M. D.)

Symptomatology.—Smallpox is among the more constant of the eruptive diseases. We have the so-called simple smallpox (variola vera); we have malignant or hemorrhagic smallpox, and varioloid or mild smallpox, as modified by previous attacks. Simple smallpox is divided into three varieties for the purpose of study, as we see it so arranged in our latest text-book: The *discrete,* in which the pustules remain distinct from one another; the *coherent,* in which, though at first distinct, they finally come in contact and join at the edges; and the *confluent,* in which, almost from the beginning, they run together. It must be remembered that these varieties represent simply distinct

degrees of intensity, and that they are not sharply separated from one another.

The course of an ordinary smallpox is divided into four periods: First, that of invasion; second, that of eruption; third, that of suppuration; fourth, that of desiccation and desquamation.

Invasion.—The stage of invasion generally comes on suddenly, with symptoms of severe fever. The young child becomes fretful and restless; the skin is hot, and may be either dry or perspiring. Vomiting sets in early, and is generally persistent; there may be constipation, but in young children and in severe cases diarrhea generally prevails for at least the first four or five days. The respiration is hurried, drowsiness comes on, and, if old enough, the child complains of severe headache and constant pain in the loins. Frequently there is abdominal pain of a colicky character, which is increased by pressure in the epigastric region. The drowsiness may deepen into stupor, and convulsions or delirium set in. The first onset, in severe cases, may be with a convulsion, from which the child passes into a state of stupor, only to be broken by repeated convulsions. In older children the first complaint is generally of chilliness, with or without a distinct rigor; this is followed by fever, great prostration, vomiting, and continuous backache. Sometimes there is a temporary paraplegia of the lower limbs, with complaint of a feeling of numbness, and not infrequently with an incontinence of urine and feces, which passes off in a few days. The tongue is coated, the tip edges being of a deep red; the pharynx in many cases is congested, but not to the same extent as it is in scarlatina. There is much variation in the degree of fever. The temperature in the axilla may vary from 102 degrees to 105 degrees Fahrenheit. The pulse is full and frequent, and ranges from 120 to 160. These symptoms last until the appearance of the rash, which generally takes place on the third day, though it is sometimes delayed until the fourth day. It is said that frequently the most violent symptoms at this stage in a nervous child eventuate in a harmless varioloid; but sometimes the tender constitution of the infant may fail beneath the severity of the disease, and death ensue before the eruption can make the diagnosis certain. Sometimes the invasion symptoms are so mild that they are overlooked by the mother or nurse. During this stage, more frequently in children than in adults (as stated by various authors), certain *temporary or initial rashes* occasionally make their appearance. They are apt to be misleading, and therefore require careful attention. They generally occur about the second day, but it may be a little earlier or later. When they are erythematous in character, they may generally be classed under one of two varieties, scarlatiniform, resembling an erysipelatous or scarlatinal rash, and the macular, closely resembling the eruption of measles. Either of these, it is said, may more or less cover the whole body.

Stage of Eruption.—On the third day, as a rule, the true eruption of the disease makes its appearance. Coincidently with it the temperature begins to fall, the pulse becomes quieter, and an amelioration of all the symptoms takes place, except in the severer forms of the disease, when this relief is very partial and the fall in temperature is very slight. The eruption in most cases may be first noticed on the face, and its earliest manifestation will be found on the upper lip, around the alæ of the nose, on the forehead, and on the chin. There are reported cases in very young children where the eruption makes its first appearance sometimes about the genitals and in the fold of the groin, or about the lower part of the loin, or on the thighs. It is rarely seen on the back of the wrists and on the neck, and spreads consecutively, in the course of the following twenty-four to forty-eight hours, then over the chest, back, arms, lower part of the trunk, and lastly on the lower extremities. Some of the papillæ may almost always be seen on the palmar and plantar surfaces. It is most abundant on the face and back of the hands, next on the neck and arms, least on the trunk. The eruption quickly changes into distinct papillæ, and these again into vesicles, which are usually fully formed upon the face by the third day of the eruption, but do not mature upon the extremities until two or three days later. The vesicles are found in various sizes, always, as stated, in the discrete form larger than in the confluent variola, and very distinctly umbilicated, except upon the face. They are surrounded by a red areola, and on the face are usually opaque and purulent by the seventh or eighth day. During the stage of eruption the mucous membrane of the conjunctiva, mouth, pharynx, and larynx, vulva, and prepuce are intensely red, and have on them frequently an eruption, which is usually proportionate in severity to that upon the surface of the body. The defervescence at the beginning of the period of eruption is often abrupt, the temperature continuing low until about the seventh day.

Suppuration.—This period usually begins from the seventh to the eighth day, and lasts about four days. During this stage the vesicles are converted into swollen pustules, accompanied often by great subdermal swelling, excessive irritation of the skin, and great pain upon movement. In severe cases violent conjunctivitis, excessive salivation, dysphagia, dyspnœa from œdema of the glottis, or bronchial inflammation may occur. The fever during this period is pronounced; headache is usually present; the sleep is restless, and often there is delirium.

The fourth period, that of *dessication*, may be considered to commence at the eleventh day, and to last from ten to twenty days, or even longer. On the face, and sometimes on other portions of the body, the pustules break, discharging their contents, so as to make a purulent mask, or each pustule in mild cases may form its own distinct scab. The surface, as the scab falls off, is left of a reddish wine color, often

excoriated or ulcerated; so the cicatrices of various form and appearance remain after convalescence.

Complications may be expected to set in at any time, even during a discrete smallpox; usually they are wanting. During the stage of invasion there is habitually an increase in the specific gravity of the urine, which may rise to 1,075, and is largely due to extreme elimination of urea through extractives. Creatinin Hanthin, tyrosin indican, and the sulphates are augmented; the chlorides are diminished." (Fitz.)

During the stage of eruption and suppuration, however, the urea is found to be diminished, while the chlorides are greatly increased. Defervescence is often accompanied by a critical discharge of uric acid.

Confluent Smallpox.—"In this the lesions coalesce, sometimes towards the end of the papular stage, but more frequently when the vesicles are changing to pustules. In this type the disease always assumes a severe character. Diarrhea has a special tendency to appear in children during the stage of invasion in *confluent smallpox.*

"The eruptive stage is marked especially by a failure of the constitutional disturbances to subside, and by the peculiarities of the eruption. The whole surface of the face becomes excessively swollen. The eruption appears small, slightly elevated maculæ, rapidly developing into conical papillæ about the size of a pin's head, or a little larger, pale red in color, and distinctly indurated to the touch. On the second day these papillæ are deepened in color, larger, more elevated, and new ones have come out in the intervening spaces, so that they seem more numerous than on the first day, and rapidly coalesce, so that in the vesicular condition the eruption seems to be bullous. The papillæ are more distinct in the lower abdomen. They are distinct from one another, but they are always smaller and more numerous than in the true discrete variety of the disease. The fever, though it may abate for two or three days, never disappears, and the pulse remains frequent. During the period of suppuration the swelling of the surface becomes enormous; the features of the face almost disappear, the eyes being closed, while the movements of the swollen extremities are extremely painful. If the patient survive, desiccation begins about the eleventh day, but the fever persists, and rarely disappears until the fourth week, by which time the face is usually desquamating. Death may occur at any time during the disorder; it may be due to adynamia, and be preceded by violent delirium and coma, or may be the result of asphyxia, produced by a rapid congestion, by a bronchial pneumonia, or by an œdema of the larynx. Frequently death will occur through septicemia; sometimes it is due to a sudden cardiac failure, the result of a myocarditis.

"*Hemorrhagic or Black Smallpox.*—This is the most malignant form of the disease. The stage of invasion is usually very short, accompanied with very violent vomiting, anxiety, dyspnœa, horrible backache, and epigastric constriction, while the rash which precedes

the eruption is more constant and severe, and has a much greater tendency to be purpuric than in the ordinary disease. The hemorrhages usually appear about the fifth day, first as petechial spots, then subconjunctival ecchymoses, accompanied by violent epistaxis, hematuria, and at last bloody discharges from the mouth, intestines, uterus, bronchial tubes, and ears. During the whole course there is great adynamia, with rapid, feeble pulse, heavy, malodorous breath, not rarely paraplegia with retention of the urine, various anæsthesias or hyperæsthesias, diphtheroid exudation, tympanites, and sometimes enlargement of the liver and spleen. The eruption is always discrete and of a brownish or blackish color, while the vesicles fill with blood and go into pustulation. The temperature is at no time very highly elevated. Delirium and convulsions and terminal coma are common, but sometimes consciousness is retained almost to the end; death occurs from syncope or asphyxia." "In foudroyant cases the end may be reached before the appearance of any rash; more frequently it occurs after the rash, but before the specific eruption has been well formed. In cases less malignant the hemorrhage may not begin until pustules are well developed." (Wood.)

Prognosis.—In the unvaccinated, it is said the younger the child the greater the danger. Even when the attack is discrete in character, almost all under one year die, and a large proportion of those under two years. In such, even when convalescence seems to have set in, a sudden change may occur about the fourteenth or fifteenth day, and death ensue. Above the third year the simple or discrete variety generally terminates favorably, but the confluent is very fatal in children of all ages. Any enfeebling disease, such as scrofula, phthisis, or syphilis, renders the prognosis bad. The amount of the eruption governs the prognosis to a great degree, as also the extent to which the mucous membranes are implicated. During the development of variola, any cessation or irregularity in its course is to be dreaded. Any sudden fading of the eruption or unusual pallor of the skin, any failure to become full and swell out about the eighth day, or any sudden shrinking of the pox, as if by absorption of its contents, is of the gravest import, and is generally followed by death, frequently within twenty-four hours. On the other hand, a good defervescence on the appearance of the eruption, a bright and rosy areola, with a moderate eruption filling out well about the eighth day, a fair return of the appetite, and a moderate secondary fever with no complications, are all of favorable import. In the hemorrhagic forms of the disease the prognosis is always very bad. A few cases in which hemorrhagic symptoms set in during the pustular stage may recover, but in general death is said to be certain. Laryngitis, if severe enough to cause distinct difficulty of breathing, is mostly fatal. Complications should be looked for if the secondary fever runs high. Different epidemics vary much in their mortality. Those occurring in summer, as noted, are generally more dangerous than those occurring in winter (Cursch-

mann), and the mortality is usually less at the end of an epidemic than at its commencement. Varioloid is rarely fatal, and has no complications.

Diagnosis.—It is very important that a diagnosis be made as early and as promptly as possible. An error either way exposes the physician to merited blame, which, in general, the subject will not be slow in making known to the doctor. Where there is any suspicion, it is well to have definite knowledge on the following points: Are there other cases of smallpox in the neighborhood? If not, has the child been inoculated, or has it had a previous attack of smallpox? Has there been any possible exposure that is known of?

During an initial stage, it is impossible to make an absolute diagnosis; but in the absence of effectual vaccination, and with possibility of previous exposure, we should regard with suspicion the symptoms of this stage appearing without other sufficient cause. Except in cases of known exposure, a physician is not hardly justified in speaking absolutely until the characteristic eruption fully appears in the form of small, distinct, "shotty," papillæ, seen first on the face and forehead, and perhaps on the back of the wrist, and successively invading the neck, trunk, arms, and lower extremities, and visible on the mucous membrane of the mouth and fauces. Should there be any irregularity in the appearance, or doubt about the symptoms, the proper course recommended is to wait another twenty-four hours, until the papillæ on the face become vesicular. At this time a diagnosis ought to be made with certainty.

In the suddenness of invasion, smallpox may resemble pneumonia; but it is to be distinguished at once by the absence of physical signs, and by the intensity of the backache. Owing to the character of the initial rashes, not rarely mistakes of diagnosis between it and scarlet fever or measles have been made. It is to be distinguished from scarlet fever by the absence of sore throat, and by careful attention to the minute characters and especially to the topography of the initial rash, which in smallpox is always limited in its distribution, is especially abundant on the abdomen, and rarely, if ever, appears on the face. The rash of measles appears later than does the initial rash, and differs also in its distribution. Furthermore, in both measles and scarlet fever the backache is never so severe as in smallpox. Although the differences seem so clear, yet cases do arise in which the diagnosis must for a time remain uncertain, requiring the physician to wait for the appearance of the shot-like feel of the papule on the upper forehead, before sending the patient to the hospital.

From smallpox in the vesicular stage, varioliform syphilide, which is often accompanied with a pronounced fever, is to be differentiated by the slowness of its evolution, by the absence of backache, and by the fact that the temperature does not fall on the appearance of the eruption. Chickenpox is to be distinguished from varioloid and other mild forms of smallpox by the oblong form and greater size of its

bullæ, by their irregular dissemination, by the absence of distinct umbilication and suppuration, and by the lack of severe constitutional disturbances, which are so characteristic of smallpox. There are, however, said to be cases in which for a time the diagnosis between chickenpox and very mild varioloid must remain in doubt. The severity and universality of the hemorrhages and the abundant petechiæ distinguish malignant smallpox from malignant scarlet fever, cerebro-spinal meningitis, and other similar affections. If death does not occur before the fourth day, the papillæ, even if they are not plainly apparent in the deeply discolored skin, can be felt in the region of the upper forehead along the edge of the hair. (Wood.)

Treatment.—Isolation should be insisted upon from the first moment at which suspicion of the nature of the disease is aroused. The room should be very freely ventilated, or the patient may be put into a large tent, if it is in summer weather. Good ventilation should be insisted upon, so as to prevent any condensation of the poison. All carpets, rugs, pictures, and surplus furniture should be removed from the room, to afford as few resting-places for the poison as possible, while the personal and bed linen should be changed frequently, and always dropped at once into corrosive sublimate solution or into boiling water.

The surface of the body should be frequently bathed, with the free use of carbolic-acid soap and warm water, and after the bath the water should always have added to it sufficient corrosive sublimate (1 to 5,000, or if carbolic acid 1 to 200) to destroy all germs. All discharges from the body should be immediately disinfected. (See Typhoid Fever.)

During the whole course of the disorder, unless there is a tendency to subnormal temperature, the patient should be lightly covered in the bed. Highly nutritious and easily digested food should be administered, such as milk, raw or soft boiled eggs, strong broths, etc. It must be remembered that the suppurating process is very exhausting, and the patient should be fed up to the full power of digestion. The use of baths is of the greatest importance. In the stage of invasion the hot bath will generally relieve the pain, while whenever the fever is high, the cold bath will reduce the temperature and often moderate the nervous disturbances. If there is delirium and subsultus, with a temperature of over 102.5 degrees Fahrenheit, the bath of 80 degrees Fahrenheit may be used every three hours, the temperature of the water being reduced if it is not low enough to cool the patient. Symptoms must be met as they arise. Opium is especially useful in the period of invasion, and when there is much vomiting should be given in the form of suppositories. It is serviceable when in the advanced stages there is great irritation from the suppurating skin, or when there is insomnia combined with delirium.

Laxatives in most cases are required from the beginning; but if diarrhea should exist, as it does sometimes, opium, bismuth, salol, and

similar remedies are employed. Chloral given in small doses along with opium and hyoscine is sometimes used in controlling maniacal outbreaks. As prostration comes on and increases, alcoholic stimulants, strychnine, and other stimulant remedies should be used. It is said to be doubtful whether in malignant smallpox any drugs have perceptible power for good; nevertheless, various stimulants may be freely used and an attempt may be made to check hemorrhage by the use of ergot, and other hemostatic remedies. (Wood.)

Strong light should be excluded, as it is thought it increases the tendency to pitting on the face and hands. For children the diet should be digested partially, or digestants should be used, such as some good preparation of pepsin or pancreatin, associated with the food by administering it just before or immediately after the food. During the invasion stage, however, only the blander fluids should be permitted, owing to digestive disturbances; but during the eruptive stage feeding must be pressed, especially if the case is severe. Much tact and considerable coaxing may be required to induce the little one to attempt to swallow, but it is important that as much nourishment as possible should be taken. In general it will be best given in small quantities at short intervals day and night. Variola is a self-limited disease, and Rillet and Barthez long ago pointed out that all therapeutical treatment tending to disturb its normal course is harmful. It should be remembered that with our present knowledge, we have no specific drug that will control or modify the course of variola. Depressing measures of all kinds are said not to be beneficial in children, and should be avoided. (Blackader, M. D.)

For vomiting, small doses of cocaine afford much relief. Should it fail, other gastric sedatives, such as soda, sub-carbonate of bismuth, citrate of magnesia, or some mild laxative may be employed. During the entire period of eruption one important indication seems to be to relieve the irritation of the skin and mucous membrane. Hyde uses a solution containing one drachm of boracic acid with a drachm or two of glycerine to a pint of water as warm as may be comfortably borne. Cloths wrung out of this should be constantly applied, changing them as they cool. During the night-time, or when the patient is sleeping, they should be covered with oil silk to retain the heat and moisture. If the eruption is very profuse over the body, and the irritation very great, a mixture of olive-oil and lime-water in equal parts is recommended by Dr. Welch, to be painted over the parts from time to time with a large camel's-hair brush.

Dr. Tomkyns states that he has used with much success in the fever hospital, Manchester, England, a thin solution of common starch, glycerine, and tincture of iodine (glycerine, ʒss; tinct. idini, ʒij; solution amyli, oss), to relieve the dermatitis and prevent pitting.

Schwimmer strongly recommends the use of the following paste: Carbolic acid, 4 to 10 parts; olive-oil, 40 parts; prepared chalk, 60 parts. Make a soft paste to be spread on soft linen, and with this cover the

face and arms. The linen should be changed every twelve hours. This diminishes the intolerable itching and fetor of the later stages; and to lessen the contagium the body should be sponged with some antiseptic solution, such as solol (1 to 10), boric acid (1 drachm to 1 pint), corrosive sublimate (1 to 5,000), and carbolic acid (1 to 200). The sensation of the patient, if old enough, should be the guide in regard to the temperature of the compresses used, and also, in a measure, to the strength of the solution if the subject be an adult. When tepid compresses or applications are preferred to cold, they should be used. During the stage of suppuration and desiccation, prolonged warm baths, in which the patient is immersed for two or three hours once in twenty-four hours, and by which the local inflammation is often greatly reduced, is said to be the Vienna plan. If the bath can not be employed the patient may be washed three or four times in twenty-four hours with a warm solution of corrosive sublimate (1 to 5,000). Complications must be treated on general principles, avoiding anything approaching systematic depletion. During the stage of convalescence, iron tonics are used in large quantities. The muriated tincture of iron is preferable. Vaccination and re-vaccination is recommended by most authors, as being the most effective preventive measure against the disease.

CHAPTER XXXIX.

PERTUSSIS (WHOOPING-COUGH).

Definition.—Whooping-cough is a contagious disease, especially attacking children; it depends on a specific poison, and prevails epidemically and sporadically. It is characterized by fever, malaise, violent paroxysms of coughing, with spasms of the glottis and irritation of the respiratory tract and catarrh.

It attacks both sexes and all ages. It may be complicated with other lesions, as ulceration of the frenum lingua, enlargement of the tracheo-bronchial glands, paralysis, convulsions, jaundice, catarrhal pneumonia, tubercular meningitis, and other diseases of children.

Etiology.—The exact nature of the poison is not entirely determined. Deichler affirms that it is an amœboid protozoon. According to Afanassieff, it is a short bacillus, pure cultures of which, when applied locally, cause in the lower animals respiratory catarrh. Linnæus foreshadowed modern views when he endeavored to prove that *tussis sicca,* or *dry cough,* was produced by animalculæ or had an insect origin. The insect of Linnæus is the microbe of Pasteur. Thus two great minds arrived at the same conclusion.

Since M. Afanassieff, many experiments have been made on animals with D. Aronval's thermostat cultures, which were injected into the windpipe or lungs of dogs and rabbits, of course under antiseptic precautions. The animals all contracted a disease similar to whooping-cough, often complicated with broncho-pneumonia. Several died, and dissection showed that the mucous membrane of the bronchi, of the trachea, and even of the nose, are the chief seats of the injected bacteria. This same bacterium was found in the lungs and respiratory mucous membranes of children who died of whooping-cough. M. Afanassieff considers it to be the true cause of whooping-cough, and names it the *bacillus tussis convulsivae.* We are thus a step further on the way; and as Schwenker[1] and Wenat[2] have confirmed M. Afanassieff's observations, a great lucuna has been filled up. Whooping-cough can not persist long without leaving some impression on various parts of the frame. The imperfect aeration of the blood, the disturbances of the circulation, the very concussion produced when in a severe paroxysm the child is shaken from head to foot, grasping with instinctive haste any support it can lay hold of to break the force of the concussion, the incessant, teasing, harassing cough, the

[1]Schwenker, *Lancet*, Jan. 7, 1888.

[2]Wenat, *Medical News*, June 2, 1888.

vomiting, can not occur without altering in some way either the texture of the mucous membrane of the throat, bronchia, or bowels, or the structure of the lungs, the heart, or the brain and its meninges.

Morbid Anatomy.—As the characteristic change in pertussis, we find the mucous membrane in a highly injected and irritable condition. There is catarrhal inflammation of the respiratory mucous membranes; in life the conjunctivæ are frequently seen in a state of intense congestion, and we have hemorrhage from over-distension of the blood-vessels caused by the violent paroxysms. The so-called cough region, which is supplied by the sensitive filaments of the superior laryngeal nerve,—the *posterior wall* of the *interytenoid region,*—seems in most cases observed to be the chief focus of the disease.

Complications.—Capillary bronchitis, usually the result of exposure to cold or of an unequal temperature, is one of the most frequent complications in whooping-cough. Pulmonary collapse is said to be the result, very frequently, of bronchitis. If one or more of the tubes becomes choked up with mucus during expiration, some air is forced out by the side of the mucus, but each respiration draws the phlegm into a narrower part of the tube. Air is expelled, but none is taken in; the consequence is that the air-sacs collapse. For our knowledge of this condition we are indebted to Sir John Alderson, who, in 1830, described the anatomical character of this collapse.

Enlargement of the tracheo-bronchial glands is very commonly met with in delicate and strumous children, in whom there is enlargement of the cervical, inguinal, and other superficial glands.

Pneumonia is the result of cold and other causes, as inflammation of the pleura; but the post-mortem appearances are found to be identical with those observed when the patient has died from pneumonia uncomplicated with whooping-cough.

We know that circulation is disturbed, and the perfect aeration of the blood is interfered with in pertussis. As a rule, it is observed that whooping-cough does not leave behind it any permanent cardiac lesion. We may have general disturbance of the nervous system produced by the long-continued cough and paroxysms. In infants in whom the process of dentition is still going on, this disturbance may lead to formidable convulsive seizures, especially in irritable children.

Symptoms.—Authors have divided the disease into three stages. Physicians as a rule do not often see the disease in the first stage, as mothers do not call in a physician until the characteristic paroxysms have appeared, when we hear "the whooping-cough." The first stage comes on unsuspectedly and insidiously. The child may be cross, have some slight fever, malaise, and restlessness, or the fever may be wanting, but when present the rise of the temperature is toward evening. This is called the catarrhal or first stage. The period of incubation in whooping-cough is usually three or four days, but it may be as short as forty-four hours, or may extend over a week. The

mother usually thinks the child has a cold. We observe catarrhal symptoms, which soon pass away under a little domestic treatment. Castor-oil is usually given by the mother, and the chest is rubbed with camphorated oil, or goose grease, or something of the sort, and the child is better in the morning. The child may be so well that it is allowed to go out without any extra precautions; but on its return to the house the cough is worse, and it exhibits more manifest symptoms. There may be some discharge from the nose, the cough is more urgent, and the child is more restless and uneasy, and cries as if in pain. This stage progresses, and there are still more pronounced symptoms of catarrh. With a little more extra care, the child may again appear better. If it is taken from a warm room to a cold room, or after having been warmly wrapped up the extra clothing is taken off, again there is a change. The cough returns with intensity, occurring in repeated attacks, during the intervals of which the child pants for breath. The second stage is now approaching.

The question is asked, How long does the first stage last? Some authors have estimated it as averaging from eight to fourteen days (Burger); Lombard observed the length of time to be from four to six weeks; Wunderlich, from three to six days; West, from two to twenty-five days. Wood and Fitz estimate it sometimes to be shortened to three days or even less; but more frequently, they state, it is prolonged up to six weeks. As a rule, the younger the child, the shorter the catarrhal stage.

As the second stage is reached, the coughing becomes more paroxysmal, the characteristic whoop is heard, and the nature of the disease is assured. The child will suddenly grasp for something to hold onto while the paroxysm of coughing lasts. The pulse becomes rapid, the breathing short, and then the coughing commences. The air being forced out in sudden jerks, the cough is explosive, rapidly repeated, with almost no respiration between the expulsions of breath, and with an increasing turgidity and cyanosis of the face, which may continue until the whole countenance is dark and swollen, with prominent eyeballs, protruding mouth, and watery eyes; suffocation seems imminent, while a long-drawn whoop is given. A repetition of the pneumonia, of varying length, occurs, until vomiting ensues, or till the attack exhausts itself. Many children are utterly exhausted by the attack, though others are at once able to resume their amusement. The paroxysms may be so severe as to bring on convulsions, hernia, or prolapsus ani. The paroxysms are irregular in their occurrence, and are most frequent at night.

How long does this second stage last? The duration is about four weeks to seven or eight weeks. Children well-to-do, who are in good circumstances and can have good, careful nursing and all that it implies, suffer less than those who have poor care. After a varying time, the paroxysms become less, and the child reaches the third stage. There is a gradual diminution in the intensity of the paroxysms, the

cough loses its peculiar character, the whoop is less frequently heard or is absent. The bronchial catarrh often persists for a while, then gradually disappears, and the course of the disease is at an end. The duration of the third stage depends on the hygienic surroundings and the care of the child. A cold will cause typical paroxysms of whooping long after the disease has disappeared.

Diagnosis and Prognosis.—The diagnosis is often difficult. Known exposure or the prevalence of the disease in the neighborhood is presumptive evidence. The characteristic whoop makes the diagnosis simple. The first or catarrhal stage is made difficult when there is no knowledge of the disease in the community. The prognosis must depend upon the condition and age of the child. History and experience teach us that the disease is more serious than is generally thought. Whooping-cough is popularly supposed to be not a very serious disease. Statistics show a high mortality among the poor and among badly-nourished infants. Hence mothers should use great care, which can be given by parents, and save much extreme suffering from exposure to cold, which seems to prolong the paroxysms.

Complications.—The most fatal complications of whooping-cough are inflammations of the respiratory tract. Broncho-pneumonia is not uncommon, and even in the most favorable cases may run a very slow and dangerous course. Atelectasis is very frequent in weakly young children. Emphysema is often developed, but very rarely remains after the disease passes off. A paroxysm may end in convulsions; the convulsion may be purely functional, but it may be due to a rupture of a meningeal or other cerebral vessel, and be followed by hemiplegia, aphasia, or other evidences of focal organic brain disease. In such cases epilepsy, spastic paralysis, aphasia, imbecility, blindness, or similar loss of function, may be the result of a permanent brain degeneration. Rachitic or tubercular tendencies are much intensified by the whooping-cough. (Wood.)

Treatment.—1. Prophylaxis.—Isolation and disinfection are as important and powerful in suppressing the contagium of whooping-cough as in the case of other diseases of the class, but probably some cases are improved by being taken into the air. The disease is continually met with in public places and in street-cars and in public vehicles or conveyances. The contagion may be conveyed or carried in fomites or clothing. We think, however, that children with pertussis should not be wilfully exposed to other children, thus widely spreading the disease, which is the means of so much suffering, when it can be so easily suppressed, and save the lives of many children. Children should not be allowed to attend school when it is known that they have been exposed to the disease, till after the time has elapsed to show any catarrhal symptoms. It is time parents woke up to the fact that this is a dangerous disease, instead of saying, "The child only has whooping-cough." Yes, as statistics show, the child only has a disease which causes one-fourth of the annual mortality of children in London, only

a disease from which thousands of children die annually; and yet such high infant mortality is a matter of wonder.

There are few diseases about which there is more lamentable ignorance and carelessness among the public; though it is properly believed to be communicable, yet no precautions are taken against the infection. It is popularly believed that every child must have whooping-cough, measles, and scarlet fever; and that as it must have the diseases, the sooner the child contracts them the better. Let mothers remember that whooping-cough is not necessarily a disease of childhood, that children are not doomed by any law of Providence to either measles, scarlet fever, or whooping-cough. When it is possible to do so, parents should protect the rest of the family from exposure by isolating the case in a well-ventilated, sunny room, or send the well ones away to the country; or if all the children in the family are infected with the disease, great care should be exercised not to let the diseased children play with those who are not diseased. The sick family of children should be kept quarantined in their home, and all sanitary measures should be employed, as in other infectious diseases (see Typhoid Fever), thereby preventing the spread of the disease. It would be a blessing if it were possible to isolate every case, keeping the patients in a comfortable, well-ventilated, and sunny hospital for a lengthened period. Thus whooping-cough might be stamped out. The country people are better able to stamp out the disease, as each family is isolated from all neighbors, and with hygienic and antiseptic precautions they need not infect the whole country. This is impracticable in the city, but in the country, parents can keep their little ones (and big ones, too) at home until the disease has run its course in their neighbor's family, and then insist on the neighbor who has had the contagion cleaning up his premises; and where this is impossible on account of lack of help, let all the neighbors assist the afflicted family in disinfecting the infected premises, and by so doing they will save the lives of their children. Remember that these good neighbors must not return to their homes afterward until they themselves have been disinfected, so that they will not carry the disease in their clothing to their children.

Hence the preventive measure necessary to check the spread of this special contagium is isolation or quarantine. Pertussis never arises spontaneously; spreading, then, by contagion, as it is said, some form of quarantine should be established to keep the healthy from the unhealthy.

We realize that the children with the special contagium need the open air and sunshine, well-ventilated apartments, without undue exposure to draughts. Tightly-closed rooms aggravate the disease. In summer-time the child is best off out-of-doors, in the sun, unless the weather is very hot. A hammock in some shady place for the child to lie in is very useful when it is too much exhausted to resume its amusement after a paroxysm of coughing; in the winter-time, outdoor

exercise should be confined to dry, still days, on which the temperature is not too low. Winds are known to be more dangerous than damp. In many cases, however, the child is better confined in a large, well-ventilated, and sunny room. The food should be very nutritious and palatable; for the whole tendency of the disease is toward exhaustion. Vomiting so often takes place that it is difficult to nourish the child, so that frequent feeding should be resorted to. I have observed that the infant takes its food best immediately or very soon after vomiting. We have noticed that warm food provokes coughing and vomiting; but very soon after the vomiting, the child will resume eating, and may perhaps have another paroxysm of coughing. Let the child rest a few minutes, and in all probability it will finish its meal in comfort.

It is essential that at night the child should wear warm underclothing, at least on the body and arms, in addition to the night wrapper. The temperature should be taken three times a day. Any increase of fever shows some complication setting in, it being most usually some indication of developing pulmonic catarrh. In advanced cases, it is said that the greatest benefit is derived from a change from the country to the seaside and *vice versa*. Mild cases may progress satisfactorily without medication; but usually not only are there demands of patients for medicine, but the frequency of the paroxysms and the catarrhal irritation of the mucous membrane may be benefited by the administration of an emulsion of asafœtida, and a sufficient amount of tincture of belladonna to cause a slight dryness of the mouth or dilatation of the pupil is needed in order to get the full effect. The belladonna may also be given by atomization, so as to have its local benumbing effect upon the larynx. Antipyrine and phenacetine are very valuable drugs; they should be given in small doses for checking the frequency and severity of the paroxysms. They are usually well borne, especially phenacetine, and doses may be given, graduated according to the age of the patient, every four or six hours, according to the severity of the paroxysms.

Some authors recommend ammonium bromide; it may be given frequently with great advantage. Chloral hydrate is a useful remedy; it may be administered with the bromide of ammonium at bedtime to promote sleep, and is very useful to prevent convulsions; it may also be combined with a little opium when opium is needed to quiet the severe and teasing cough.

If there is much coryza, the nostrils should be kept clear by washing or spraying the nasal cavity or nostrils with warm salt water, or with the official peroxide of hydrogen diluted with ten times its bulk of warm and slightly saline water, or a little steam, from an atomizer, or from a kettle boiling in an adjoining room or in the room; a little carbolic acid or thymol may be added to the boiling water. Keep the air moist in the room. For steam atomizer the following solution may be used:—

℞: Acid carbolic ..... ʒss
Potass chlorate,
Potass bromide, aa ..... ʒii
Glycerine ..... ℥ii
Aquæ ..... ℥vi
Mix.

Keep the steaming atomizer near the child.

Treatment must be directed to meeting symptoms, with great care to prevent complications. Fresh air and tonics, good nourishing food, the proper protection of the body, are all required. Great attention should be paid to the diet of a child with whooping-cough. The food should be such as can be easily digested, and it should be given often, in small quantities. Milk, eggs, soups, and puddings are epecially indicated. Keep the child built up all that it is possible with tonics and food to prevent exhaustion.

To keep the bronchial tubes free from the accumulation of mucus, wine of ipecac, with the syrup of squills and carbonate of potassium, may be prescribed as follows for a child from one to three years of age:—

℞: Potassium carbonatis ..... ʒjss
Vinum ipecacuanhæ ..... ʒiij
Syrup scillæ ..... ʒj
Syrup prunus virg ad ..... ℥vi
M. et sig.

Give from twenty to forty drops to a child from one to three years of age, only when needed to aid the child in freeing the bronchial tubes of mucus.

CHAPTER XL.

PAROTITIS (MUMPS).

Definition.—Parotitis is a contagious epidemic, consisting of an inflammation and enlargement of the parotid glands. It generally occurs in youth, is acute in origin, and accompanied by fever; it is followed in some cases by abscess of the gland, but usually subsides within a week or ten days without leaving any trace.

A condition of tumefaction and inflammation may be set up in the parotid gland by a blow or some external injury, and following such trauma an epidemic parotitis may arise.

Etiology.—There is nothing known of the essential nature of the origin of the disease. Mumps especially prevails in the spring and autumn, and it is thought that the disease is not intensely contagious, as we have often seen children exposed who never took it. The law of spreading the disease is not clear. Infants are seldom attacked, and the affection is confined to the period of childhood and early youth, although sometimes adults who have not previously had it are affected. Males are more prone to be affected than females. One attack gives immunity from another where both sides are affected.

Symptoms.—The period of incubation is variously given from six days to two weeks. The prodromic symptoms usually appear about a week after the exposure. The first symptoms are swelling and pain just below the ear on one side, and a feeling of languor and malaise, loss of appetite, irritability, slight fever or feverishness. The swelling increases rapidly and extends forward, backward, and downward till the side of the face and neck are implicated. The swelling is first upon one side, and is usually followed by swelling on the opposite side within one or two days. There is pain on an attempt to open the mouth; the head is at first held towards the affected side to avoid tension of the affected muscles and tissues, but when the affection is bilateral the head is held rigidly erect. Swallowing and even speech become very difficult. In favorable cases the symptoms subside in seven to ten days, with a rapid convalescence.

A frequent and curious complication is an orchitis or swelling of the testicle (usually on the same side), with scrotal œdema, while in girls the ovary, vulva, or mammæ are similarly affected. This inflammation is not generally severe, and runs about the same course as regards time, as the parotitis. The left testicle is said to be most frequently attacked.

Diagnosis.—The diagnosis of mumps consists in distinguishing between a parotid and a lymphatic swelling. The history of the exposure or an epidemic, with the appearance of the tumor and its local manifestation, make the case so plain that it can hardly be mistaken for an enlarged cervical gland. The best test is said to be a point of intense tenderness high up in the angle of the jaw immediately behind the ear.

Prognosis.—The prognosis is favorable, no cases reported of death being due to mumps. The duration of the disease is about ten days.

Treatment.—The disease being self-limited, not dangerous, of short duration, and its specific cause unknown, a laxative, confinement in bed or to a warm room, and a light, liquid diet are usually about all that is necessary. Local applications are generally used for comfort, and also cold compresses, or ice poultices; an ice bag applied may be more agreeable.

Some authors recommend rubbing the gland with belladonna-mercurial ointment (equal parts); this is efficacious when resolution is slow. In typhoid cases appropriate support and stimulants should be given. If orchitis occurs, absolute rest in bed should be enforced, the scrotum well supported, and the belladonna-mercurial ointment used. When the tenderness has subsided, strapping should be employed.

If irregularities of the digestive system exist, they should be corrected according to the judgment of the physician. Saline laxatives will control the tendency to constipation. Should there be great restlessness or marked cerebral symptoms, it will be well to apply cold to the head, and give small doses of antifebrine, from one and a half to two and a half grains, according to the age of the child, every four hours, till headache is relieved. Small doses of aconite act well in some cases. Some authors recommend chloral hydrate or morphine in extreme cases. If a tendency to suppuration is noticed, shown by a tenderness and redness of the skin, a leech or two may be applied behind the ear. The galvanic current of electricity should be used, the positive pole applied over the tumor, the negative pole over the spine between the shoulder or just below the nuche of the neck. Give from thirty to forty milliamperes for half an hour. It has a very soothing effect on the nervous system, and prevents suppuration. The galvanic current may be applied twice a day in severe cases. Should an abscess become inevitable, its formation should be hastened by poultices made of flaxseed meal; and when formed, it should be opened, and its contents thoroughly evacuated, to prevent complete disorganization of the gland, or a possible perforation of the cavity of the tympanum.

CHAPTER XLI.

ERYSIPELAS.

Definition.—Erysipelas may be defined to be a dermatitis having a tendency to spread rapidly, accompanied by comparatively severe constitutional symptoms, with rapid resolution and complete return to the normal condition. It is also contagious under special conditions, as in case of wounds.

Etiology.—Anybody and everybody is liable to be affected with erysipelas. We find erysipelas occurring with greater or less frequency in all places, at all seasons, and under most varying external conditions. It may follow injuries or operations, as is often seen, when it is called surgical or traumatic erysipelas. Erysipelas may arise without any injury, as the medical or idiopathic form.

The contagion of erysipelas consists of the streptococcus originally described by Fehleisen under the name of *streptococcus erysipelas,* but now is generally believed to be identical with *s. pyogenes.* Hippocrates spoke of this disease in his writings; it is also referred to by Galen, who supposed that a bilious humor, in its efforts to escape from the blood through the skin, caused erysipelas.

This organism has been repeatedly found in phlegmonous suppuration, in ulcerative endocarditis, and in puerperal endometritis. The organism occurs in chains. It is thought that in medical erysipelas the organism finds its way through some crack, excoriation, or abrasion in which it effects a lodgment, and that all erysipelas is the result of inoculation at the beginning of an outbreak.

The causes are the direct and the predisposing. The disease is rare before puberty, and still less frequent in the very old. Certain individuals and certain families are more susceptible to the poison than others; excessive or chronic alcoholism, Bright's disease, and lowered vitality are predisposing causes. Recently-delivered women are especially prone to the disease. The contagion is not usually very virulent, but it can be conveyed by a third person, and may lurk in furniture or on the walls or fomites, etc. Under special circumstances not understood, the poison of erysipelas becomes endowed with great virulence and reproductive power, resulting in epidemics. It is said to be more frequent in the first year of life, and after that age it occurs as often in adults as in children.

Seasons.—Erysipelas is supposed to occur more frequently during the cold than during the warmer months. This is not invariably the case, as it does occur during the summer months; for we see it

reported that in Paris, in 1861, one of the severest epidemics occurred in the summer-time. Not infrequently erysipelas returns in the same patient every year or oftener. This is especially the case when the face is the seat of the disease, and in instances where chronic rhinitis, eczema, or some other form of chronic inflammation exists, from which infection occurs.

Symptoms.—The incubation stage is variable, or from three to seven days. In children over six months of age a rash is seen that resembles that of erysipelas in adults, differing only in slight respects.

Erysipelas may be introduced by a prodromal stage. The child may be drowsy or restless, with more or less fever. With adults who complain of headache and malaise, it is usually ushered in by a chill, which is sometimes very severe, followed by a rapid rise of temperature.

In younger children there are often convulsions and vomiting following the chill. The temperature may rise as high as 105° Fahrenheit. Usually the dermatitis begins to develop immediately. There is a feeling of heat, tension, and pain in the affected part, which becomes mottled pink and somewhat œdematous. The patches gradually become more intensely red, and coalesce to form a single fiery patch, and the color disappears on pressure and reappears when pressure is removed. The erysipelas is slightly elevated, and is often separated from the sound tissues by a sharp ridge, which can be felt if not seen. The surface is smooth and shining, and often becomes vesicular or even pustular within twenty-four to forty-eight hours. From this elevated edge the erysipelatous infiltration rapidly extends to the neighboring skin; and as the disease progresses, the parts behind gradually become paler, and within two or three days have all the appearances of healthy skin. The disease may extend more or less rapidly, and over a smaller or larger territory. The fever remains high through the progress of the disease, and is accompanied by more or less constitutional symptoms. The appetite is lost. Nausea, vomiting, intense headache, and thirst are present. The tongue is covered with a thick, dry coat. The urine is passed in small quantities, and frequently contains albumin. Sleep is much disturbed. In some cases there may be delirium. The mucous membrane adjoining the skin is oftentimes likewise involved in the process. In the cases terminating in recovery, the redness gradually becomes pale, the swelling subsides, and the fever disappears. Where death ensues, it usually occurs while the temperature is high.

The Seat of Commencement.—Erysipelas begins most frequently about the face. There is some local affection of the skin as its point of origin. This is most frequently situated where the skin passes into the mucous membrane, at the nose, near the angles of the eye, about the nostrils, ear, or chin. The genitals may be its seat of origin. The writer witnessed a case of erysipelas in an infant six weeks old who was affected with the disease of the vulva. It was thought to be due to the diapers being washed with two strong soap and not well rinsed,

which caused an inflammation; erysipelas took place, and resulted in death. (Mothers should take warning and never use any soap but castile for washing the infant's napkins, and should rinse them thoroughly.) Erysipelas may arise (as reported by O. P. Rex, M. D.) in the mucous membrane, as, for example, in the pharynx, and may then extend outward to the skin and then run its usual course.

In fact, many of the cases of facial erysipelas in which no point of origin can be found, and which were formerly thought to be idiopathic, proceed from the interior of the nose. These internal forms may pass outward upon one of the following routes: First, to the lip; second, through the choanæ and nostrils; third, through the nasal cavity and lachrymal ducts; fourth, through the Eustachian tube, passing through the middle ear to the external ear. The tympanum offers no obstruction. Many of the cases of erysipelas which appear at the root of the nose pass through the lachrymal duct from the interior of the nose. Under such circumstances the lachrymal sac appears distended, as when obstruction of the duct occurs. This sign may precede the external erysipelas, which occurs with greatest frequency in the head, next on the trunk and extremities. Upon the surface of the skin erysipelas usually begins as a mottled pink patch, which rapidly becomes dark and confluent. It runs in the direction of the lines of least tension of the tissue. At parts where the subcutaneous tissue is firm and adherent, the progress of the disease is arrested, as, for example, at the base of the skull, over Poupart's ligament, etc. (Rex.) The surface of the skin may be smooth and glistening, but is often covered with vesicles that vary in size. The blebs are sometimes tinged with blood, and gradually become turbid from admixture of pus and epithelial cells with the serum. There is always more or less swelling and redness, depending upon the severity of the disease. On the third to the fifth day the erysipelas subsides, and the affected parts gradually fade. The vesicles are absorbed, or burst, or dry to yellowish crusts. In the subsequent desquamation the cuticle is shed in a fine scurf, or peels off in layers.

In the new-born, erysipelas usually begins about the navel or in the region of the genitals. On the first day all that is seen is a slight blush of the affected parts. The infant suckles well, and may not have any fever. This may continue for three or four days, especially if the child is robust. Soon, however, a change occurs. High fever develops; the child refuses to nurse, or takes the breast reluctantly; and it nurses irregularly, and vomits that which it has taken. The infant becomes restless, sleepless, and cries continuously; the pulse is irregular, small, and frequent. Diarrhea with stools that are yellow occurs in the beginning, but later the dejecta, or stool, becomes green and liquid. At the same time the affected skin becomes enormously distended and glistening. The tension of the part is so great that it is difficult to make an impression, and this when made rapidly disappears. Phlegmonous inflammation with the development of sub-

cutaneous abscesses is very frequent. In many cases gangrene of the affected parts is said to occur. Death almost invariably results. The child either becomes more and more soporous, and finally passes away in a condition of coma, or death may be ushered in by convulsions. The course of erysipelas in a new-born is more erratic than in adults, but the progress of the disease is not attended with the same exacerbations of fever; the fever does not usually reach the height which it attains in older children. The disease generally lasts from five to fifteen days; but the progress of convalescence is often retarded by abscesses or gangrene. Death may be hastened by complications, which readily ensue, especially peritonitis, which is apt to be produced by extension of the inflammatory process through the umbilical vein. Meningitis, pleuritis, and pulmonary complications are by no means rare.

Course.—Erysipelas is an acute disease, and runs its course, as a rule, in from ten to fourteen days. The duration is longest where the trunk is involved, and shortest where it is localized on the extremities. Relapses of erysipelas are frequent. The second attack usually has the same seat and runs the same length of time as the first, but is apt to be lighter.

Gastritis and enteritis may exist as primitive diseases, but as such are rare.

In puerperal women with facial erysipelas rigorous antiseptic precautions will almost invariably prevent local infection of the genitals. The vulva should be kept well covered with antiseptic dressing.

Complications.—In adults and children suffering from erysipelas, meningitis, neuritis, pleuritis, arthritis, pericarditis, myocarditis, and endarteritis have been reported and proven to occur; but these diseases are less frequent than endocarditis. Albuminuria is commonly present in ordinary erysipelas, and also of all visceral complications nephritis is the most common.

Diagnosis.—The symptoms have been discussed, and the diagnosis of external erysipelas requires no discussion. The history of exposure to the infection is difficult and often impossible. The rapid spreading of the disease, with the acute inflammation, swelling, and the serous character of the bleb, the exudate, the chill and fever, and depression are characteristic signs of the disease.

Prognosis.—In older children, erysipelas, as a rule, runs a favorable course. However, while this is true, we do have epidemics in which the prognosis is much less favorable. Erysipelas of the new-born is a very malignant disease. We see statements of nearly all observers that in the case of almost all infants under three weeks who become affected with erysipelas, the disease results fatally. After the second year the child is not in any more danger than an adult. The feebler the constitution, the greater the danger.

In adults migraine is considered a grave form, and is apt to be prolonged. In puerperal cases, or in pregnant cases, the prognosis is

said to be good so long as inoculation of the genito-urinary tract is prevented.

Treatment.—In prophylaxis, or measures for the prevention of the spread of the disease, isolation is absolutely necessary, as the contagious character of the disease has been established beyond a possible doubt. The experience in all hospitals in which erysipelas has prevailed, proves the necessity of isolation or quarantine of affected cases. In the new-born scrupulous cleanliness with antiseptic treatment of the umbilical cord, especially where the mother is the victim of puerperal disease, may, in many cases, save the life of the patient. In the treatment of erysipelas we have innumerable remedies that have been prescribed with favorable results.

In private houses we do not consider that strict isolation is essential. It would be as well, however, to keep the children in some distant part of the house, and use great care in keeping up the asepsis. The sick-room, bedding, furniture, and draperies should be kept clean; it is better to remove all unnecessary furniture from the room. Do not allow any accumulation of rags or dressing that has been used about the patient to remain in the room. These must be burned up as soon as possible after using them.

The skin should be washed with corrosive-sublimate solution (1 to 1,000), then thickly anointed with an equal part of ichthyole and vaseline, and covered with a thin layer of antiseptic cotton or gauze. The oxide of zinc ointment, made with vaseline, gives relief and subdues inflammation; if there is much burning, it may be used instead of the ichthyole dressing,—oxide zinc two drams to one and a half ounces of vaseline. The face should be washed with the corrosive-sublimate solution, as above advised, two or three times in twenty-four hours, keeping the affected parts covered with the ointment, putting it on frequently. For internal treatment I have found the tincture perchloride of iron given every four hours both day and night, according to the severity of the disease, to be good. For an adult the dose is from ten to twenty drops in a large wine-glass or tumblerful of water, to be taken through a glass tube or quill, to prevent the enamel of the teeth from being affected. The mouth may also be washed out with a little baking soda and warm water after each dose has been taken. Quinine and strychnine may be administered according to the age in proportion to each individual case. Constipation, diarrhea, restlessness, insomnia, and other symptoms should be met as they arise.

Of all the antiseptics for infants, turpentine is said to be the best. A two per cent solution, used as a spray every two or three hours, is highly recommended by Verneuil, Hueter, Tillmann, and Fehleisen.

Formerly turpentine was highly esteemed as an external application. Lueche, who finds a fall of temperature and a diminution of burning after each application, believes that the erysipelas passes off more rapidly.

Kacyorowski advises a mixture of carbolic acid one part with turpentine ten parts. After each, lead-water compresses are used, and in severe cases ice poultices are used. Under this treatment it is said that the skin turns intensely red, but the erysipelas is aborted in from twenty-four to forty-eight hours. The writer would recommend equal parts of sterilized linseed oil with the turpentine, with a very little carbolic acid added to it, for gangrenous cases.

Ichthyol two parts, glycerine one part, and ether one part, applied externally, is said to be very efficacious for infants. Rice flour, talcum, bismuth, etc., are used for cooling the surface.

The writer has found the carbolic-acid lotion, 1 to 500 parts of warm sterilized water, a useful remedy; wash thoroughly, keeping the parts anointed. Or good results may be obtained from the use of corrosive-sublimate solution, 1 to 5,000 parts of sterilized water, and followed by the ichthyole and vaseline ointment, with, as internal treatment, from three to five drops of perchloride of iron every three hours for a child under five years of age, also small doses of quinine three times a day, with good, nutritious food at short intervals, and every antiseptic precaution.

Good, faithful nursing, both day and night, and keeping the temperature of the room at about 68° or 70° Fahrenheit, is a very necessary aid in producing favorable results.

In some cases good whisky should be employed; it may be added to the milk or used in an egg-nog, or it may be administered in peptonized milk.

Benzoate of soda, large doses, is highly recommended by Haberkorn, who claims that it reduces the temperature to normal in twenty-four hours; also large doses of quinine are recommended for the reduction of temperature. No depressing remedies should be used.

In phlegmonous erysipelas the pus should be evacuated early and thoroughly, and the parts should be washed thoroughly with corrosive-sublimate solution and the ichthyole and vaseline equal parts applied and antiseptic gauze over this till the disease is under control. Then oxide of zinc ointment may be used till well. The child may have to be nourished by rectal alimentation in cases where there is obstinate vomiting. Strict attention should be paid to nursing and dietary.

In adult cases, the tincture of perchloride of iron may be given in 20 to 30-drop doses, in a half tumbler of water taken through a tube every four or six hours till fever abates; give quinine from two to three grains every three or four hours till well. Keep the liver active by giving small doses of calomel, followed with Epsom salts as necessary; use the above-prescribed lotions and ointments; keep the affected parts covered with antiseptic gauze.

CHAPTER XLII.

RHEUMATISM.

Definition.—Rheumatism is believed by many authorities to be of infectious origin. It is an acute febrile disease, characterized by inflammation of various joints in succession, profuse sweating, and a tendency to endocardial inflammation.

The term rheumatism has been used very extensively to indicate almost any affection accompanied by pain and tenderness of joints and muscles, and to include morbid conditions of widely different natures.

Etiology.—The immediate cause of rheumatism is chilling of the surface of the body. Exposure to cold is most effective when the body has been previously heated by exercise or by sitting in a hot room, and the skin is perspiring and its vessels relaxed. Under these circumstances, a draught of cold air or damp clothing from sweating is a frequent exciting cause of rheumatism; but it may be induced without overheating by prolonged exposure to any cooling influence, as a damp bed, or wet clothes, or an east wind. In the case of children these sources of chill are especially frequent; a child will perspire freely while romping and playing games, etc., and then stand about, indifferent, of course, to the dangers of wet feet and currents of cold air. It occurs most frequently in the colder months, least often during the summer. Both sexes are alike affected, especially during early adult life; but it is rare in infancy and old age. It prevails in certain families and especially in families that have a gouty inheritance. The young are strongly predisposed to attacks of acute rheumatism, while later in life muscular rheumatism, and still later in life unmistakable gout, become manifest. Some authors say that members of gouty families are not specially prone to acute rheumatism, nor are families showing a strong hereditary predisposition to rheumatism particularly liable to the manifestations of gout.

It is stated that the endocarditis of rheumatic fever is acute and usually associated with the presence of bacteria, while that of gout is chronic, without bacteria, and with degenerative aortic changes. We especially find rheumatism among persons whose occupation exposes them to sudden draughts of air and extreme changes of temperature when in a profuse perspiration, which is quickly checked by these exposures.

In children it is believed that erythema, tonsillitis, chorea, pleurisy,

and tendinous nodules may have a rheumatic origin as certainly as articular inflammation or pericarditis. They are found associated with articular rheumatism, and when alone are met with especially in rheumatic subjects. We should regard all these affections in certain instances as manifestations of the rheumatic state, although they may be set up in other instances by other causes, just as arthritis or pericarditis, while usually rheumatic, may be due to scarlatina, septic poisoning, or pyemia. They are said not to be invariably but most commonly rheumatic. Any one of the phases may be absent, one only may be present, or two or three, or the whole series may be complete in the same patient. For example, there may be articular affection alone, or there may be in addition pericarditis or endocarditis, or these may occur without any affection of the joints, or with chorea and tendinous nodules, or there may be erythema or tonsillitis instead of any of these or in addition to them. This is constantly seen in clinical experiences.

The theory of the infectious origin of rheumatism is most popular at the present time. It is based on the resemblance and similarity of distribution of many of the lesions to those found in septicemia and pyemia, the frequency of relapses, and the occasional occurrence of athritis in such infectious diseases as scarlet fever and dysentery. Additional support of the theory is derived from the occurrence of apparent epidemics at certain seasons in limited localities, especially in households, and the discovery of bacteria in the fluids from the joints and from inflamed endocardium and pericardium.

The observations made by Sahli suggest "that the various local lesions of acute rheumatism may result from a multiple localization of bacteria. No specific bacterium has as yet been found, but it is possible that various bacteria may be concerned, and that other factors may be necessary."

Pathology.—The exact method in which the child acts in producing rheumatism is extremely obscure. Several hypotheses more or less plausible have been propounded. Of these, one of the most favored is that it is due to the accumulation of lactic acid in the blood, as originally suggested by Dr. Prout and supported by Todd.

The author has inherited a rheumatic and arthritic diathesis, and can speak from experience, that lactic acid will provoke an attack of rheumatism and swelling of the joints in forty-eight hours or less time, also that milk diet will produce a similar condition.

The author has had patients who inherited rheumatic diathesis, and the milk diet had to be discontinued, because they improved more rapidly without the use of milk.

Symptoms.—The different forms of rheumatism, the nature and severity of the symptoms between acute, subacute, and chronic articular rheumatism, will be noticed separately.

ACUTE ARTICULAR RHEUMATISM.

In adults this disease is of rapid onset, sometimes appearing within a day or two after the sudden exposure of a heated person to cold. There is a chilly sensation, followed by fever, morning remissions, and evening exacerbations; the temperature may reach 104° Fahrenheit. Tonsillitis may at times be present, and may precede or accompany the attack.

The joints become red, swollen, and painful. They are often symmetrically affected, and recurrences are frequent. The articulations of the lower extremities are usually first to become inflamed; then the upper extremities, occasionally the hip, jaw, vertebræ, and pelvic symphyses. The swelling is due to the exudation of the synovial cavity, which may cause fluctuation, but it is partly dependent upon œdema of the surrounding tissues. The pain is more severe on moving the joint, and is usually worse at the outset of the inflammation, and diminishes as the exudation increases. It may be limited to the joint, or may extend along the course of the neighboring tendons or nerves. One or more joints may be affected at the same time. In the milder cases the affected joints are free from the inflammatory disturbances in the course of a few days. In severe cases the arthritis may be persistent for several days. Profuse sweating with a sour odor accompanies the inflammation of the joints, and increases as new joints are attacked. The perspiration is said not to contain lactic acid. The respiration is accelerated, the pulse quickened; headache, loss of appetite, and nausea accompany the fever. The temperature at first shows but little variation, and exacerbations of fever take place as other joints are attacked, and remissions of temperature occur as the inflammation subsides. A continued high temperature remains for some time after the swelling of the joints abates. The urine is scanty, and high-colored; its specific gravity is from 1,025 to 1,090 or more, and there are uric acid and urates. Uric acid at times may be increased or diminished. Urea is often diminished. As the fever subsides, the urine increases in abundance and becomes paler.

In determining a case of rheumatism in children, a study of the disease leads to a broader conception of its nature, and compels the inclusion within its scope of many morbid affections in addition to the arthritic. While this is the worst feature of the complaint in adults, in childhood it is often entirely absent in an attack which is undoubtedly essentially one of acute rheumatism. Moreover, many of the phases of rheumatism which, viewed from an adult standpoint, we are accustomed to regard as complications of a central-joint affection, appear in childhood as initial or chief phenomena.

Arthritis is at its minimum, endocarditis at its maximum. Endocarditis or perocarditis may appear first, or pleurisy, or chorea, or tonsillitis, or nodules, or an erythema, or an arthritis, and these may be grouped in any child. As Dr. Barlow has well remarked, the

tendency is to isolation and separation of the phenomena. "These draw more closely together as time passes on; the disease tends to appear as a whole instead of in disjointed parts; some features become accentuated, as the joint affection; others grow less constant and conspicuous with advancing age, as the tendinous nodules and chorea, and these finally disappear—except in rare instances—with the advent of adult life."

In cases of arthritis—in some instances—a little tenderness and swelling of knees or ankles or wrists may remain, possibly limited to a single joint, or even less than this, only a mere stiffness and tenderness on movement, or even a slight feverish attack, recognized afterwards as rheumatic in the light of developing heart-disease.

The following case illustrates this form: "A girl three years of age was feverish with no signs of any special ailment. Two days later the great toe of one foot became red, swollen, and tender; no other joints were affected, and it was supposed at first to be merely chilblains. Two days later still, both ankles were tender and very slightly swollen. The temperature was found to be 102 degrees Fahrenheit. The condition was now judged to be rheumatic, and the heart was examined. A full-blowing mitral murmur was found to exist, which persisted for many weeks. The joint affection quickly disappeared with rest and salicine treatment, and after many weeks the mitral murmur finally disappeared." (Cheadle, M. D.) In many cases the rheumatic inflammation is limited to tendons or their sheaths, as in stiff neck, which is occasionally the only manifestation of genuine rheumatism.

One of the most misleading signs of rheumatic joint, or tendon affection, is when it is limited to stiffening of the hamstring tendons at the back of the knee. The following case illustrates this form of rheumatic arthritis. A little girl four years old had difficulty in putting down the heel of the right foot. The case was looked upon as a surgical one of incipient talipes varus, and the limb was steadily galvanized. No improvement followed, and the patient was treated medically. There was no deformity; but the disinclination to walk was extreme. The foot could be put to the ground, but the knee was kept bent. Upon examination both knees were found to be tender, especially at the back in the hamstring tendons, and they were slightly swollen. The temperature was 100 degrees Fahrenheit. It was further ascertained that the child had suffered from pain and stiffness of both knees and ankles from time to time for the past six months. There was no cardiac or other sign of rheumatism; but the mother had had rheumatic fever, and the condition was judged to be a rheumatic arthritis. Under salicine treatment and citrate of potash the stiffness and retraction of the heel, which had lasted for weeks previously, entirely disappeared in a day or two, and the child walked perfectly.

COMPLICATIONS.

Heart Disease, Endocarditis.—In the rheumatism of childhood heart-disease plays the most prominent part. Endocarditis appears with the joint affection in the majority of cases, and a small proportion of children only escape it; if arthritis, then almost certainly endocarditis.[1] But oftener it is accompanied by the eruption of subcutaneous nodules, so intimately associated with evolution of valvulitis of the heart in early life, or by chorea or erythema. Endocarditis may appear alone, being the sole expression at the moment of the rheumatic state before arthritis is observed. Endocarditis is constantly overlooked because the insignificant joint affection is slight or wanting; the child is a little wasted and feverish; but there is nothing to call attention to the heart, and thus an insidious inflammation of the valves goes on, and is probably not discovered until long after, when hypertrophy, dilatation, and loud murmur proclaim its existence. As a rule, the endocarditis is subacute, and it is frequently protracted and relapsing; "it dies down and revives again." It attacks chiefly the mitral valve, but now and again the aortic valves suffer, and in exceptional cases they alone are affected. The first sign and sometimes the only sign of the valvular inflammation is said to be a soft blowing murmur, usually systolic, at the apex. This may gradually disappear after a few weeks, or more often may increase rapidly in distinctness, so as to become loud and harsh in the course of a few days. Yet sometimes the murmur, even if mitral, may be functional, due to temporary relaxation of papillary muscles and consequent imperfect closure and leakage, and this may disappear as strength and muscular tone return. This may, however, be due to valvular inflammation rather than functional disturbance from paresis; and the disappearance of the murmur should be referred to resolution of the inflammatory process and restoration of the valve to its normal state. A distinct mitral murmur is usually organic, indicative of endocarditis, and commonly persistent. An aortic regurgitant is invariably organic without exception.

Pericarditis.—It is thought that pericarditis is less common in the rheumatism of children than in adults; but it is in reality quite frequent, its occurrence being often overlooked.

Dr. West[2] records a case of a child seven months old, with post-mortem evidence of a previous attack at the age of four months. There are, as we see recorded, certain special features connected with pericarditis as it occurs in connection with the rheumatism of childhood which we will mention here briefly. In the first place, it is thought less liable to occur in the primary attack of articular affection, and also, like endocarditis, although it is at times extremely acute,

[1]The collective investigation statistics give in males 72 per cent of heart affection in childhood, as compared with 46 per cent in adults. In females the difference is much less.

[2]Diseases of Infancy and Childhood, 7th ed., pp. 556, 557.

it is comparatively rare; and it has a characteristic tendency to become subacute, chronic, and intermittent, to smoulder on and then become active again, with the advent, perhaps, of a fresh wave of joint affection or a fresh eruption of fibrous nodules, or the supervention of chorea. Pericarditis, again, though usually associated with joint affection, may be the first and only sign of the rheumatic state at the time of its occurrence, and be followed by arthritis or other phases of rheumatism at varying intervals; or it may be the last of the series of rheumatic events. We see statements recorded that, although not rare in the early part of rheumatism, it is most commonly observed when the heart has become already greatly enlarged by hypertrophy and dilatation, and it is then most liable to set up fever and palpitation, with excited, turbulent, irregular action of the heart, and quick pulse, sometimes excessively so, varying from one hundred and twenty to one hundred and sixty even—with cardiac pain, dyspnœa, restlessness, and distress. It does not, like endocarditis, leave a record behind it. This late pericarditis is frequently the immediate cause of death.

Pleurisy and Pneumonia.—These stand next to the affections of the heart in gravity and importance. They are much less frequent, however, and it is doubtful whether pneumonia can claim to be considered a certain phase of rheumatism. It occurs chiefly in three connections, namely, in a limited form as an accompaniment of pleurisy, in more extensive degree in relation to, and probably largely dependent upon, mitral disease of the heart and pericarditis, and in the embolic form also in connection with valvular disease. In the lobar variety associated with mitral disease it is almost always on the left side.

Lebert found that ten per cent of his cases of pleurisy were a distinct expression of rheumatism. Like pneumonia, it is most common on the left side, and frequently associated with pericarditis. The general symptoms of pneumonia occurring in the course of rheumatism are usually only a rise of temperature to 103 degrees and 104 degrees Fahrenheit perhaps, and somewhat accelerated respiration. There is little or no cough, no characteristic rusty sputum as we see in uncomplicated pneumonia, even in the case of adults, nothing to call attention specially to the state of the lungs, so that pneumonia is frequently only discovered accidentally on routine examination, and as auscultation of the posterior portion of the chest is often omitted in rheumatism on account of the pain it inflicts, the existence of the inflammation of the lungs is very liable to escape recognition. The physical signs differ somewhat from those of ordinary pneumonia. There is bronchial or tubular breathing, but fine crepitation is not commonly found. This crepitation is, however, usually present in the limited embolic form.

Pleurisy and pneumonia, occurring as simple inflammations excited by the rheumatic virus, usually resolve quickly, and fluid effused as a result of the former is reabsorbed, unless, as in some cases, it becomes purulent. But when dependent upon heart-disease it is different. The

pneumonic consolidation and pleuritic effusion are liable to remain, or disappear only after a lengthened period.

Bronchitis.—This is a less frequent symptom, but according to Lebert it occurs in nine per cent of cases.

Tonsillitis.—There is no doubt, according to recorded cases, but that children who are prone to articular rheumatism are prone also to tonsillitis, nor that it often ushers in an attack of articular rheumatism, or occurs during its course. Trousseau recognized a rheumatic sore throat. The statistics of the Collective Investigation Committee[1] shows that tonsillitis occurred as an antecedent to acute articular rheumatism in 24.12 per cent of cases, with ten per cent of sore throat of uncertain nature. This only gives instances in which tonsillitis came first in the rheumatic series; and its full significance is only realized when we consider that the throat affection occurs also as a later as well as an initial affection, although not so frequently, and that it occurs apart from articular symptoms in rheumatic subjects. It is not uncommon to see in children who are affected with rheumatism that the disease is followed immediately after with tonsillitis, endocarditis, and chorea. We observe a case reported of a patient who had repeated attacks of tonsillitis extending over several years, followed by an attack of acute articular rheumatism, which was succeeded by chorea and purpuric erythema. So there can be no hesitation in accepting tonsillitis as a genuine member of the rheumatic series.

Fibrous Nodules.—Drs. Barlow, Warner, and Hill, and some German and French observers have drawn attention to the development of fibrous nodules in the subcutaneous tissue in connection with rheumatism. They are extremely common in children, but are rare in adults, although cases in grown people have been noticed by Dr. Stephenson, Dr. McKenzie, and Sir Dyce Duckworth.[2] These nodules vary from the size of a pin-head to that of an almond or even larger. They are tender. They are chiefly in the neighborhood of joints, especially at the back of the lebon, about the margin of the patella and the malleoli. They are also seen about the vertebral spines, along the clavicle, the extensor tendons of the hands and the feet, the pinna of the ear, the temporal ridge, and the superior curved lines of the occiput and the forehead. They are chiefly confined to the front of the chest, in relation to the tendons and fascia of the intercostal muscles. They sometimes appear in successive crops, sometimes single, sometimes multiple. They have been known to develop in ten days; but they usually take as many weeks to subside. There can be no question as to their relation to rheumatism. Drs. Barlow and Warner[3] found distinct evidence of

[1] Coll. Inr. Record, vol. 4, 1888, p. 70.

[2] Chemical Society's Proceedings, vol. 15, 1883.

[3] Trans. International Medical Congress 1881, vol. 4, p. 116.

rheumatism in twenty-five cases out of twenty-seven. Their chief association is said to be with endocarditis and pericarditis, and in some cases chorea, and frequently with erythema marginatum.

Erythema.—Exudative erythema appears as one of the phases of rheumatism in several of its various forms. Of these, erythema marginatum and uticaria are the most common. The former is a frequent complication of rheumatism in children, being oftener observed in children than in adults, appearing on the body as well as on the limbs.

Purpuric Erythema.—This form is said to occur almost exclusively in young adults; but it has been seen in cases of young children. Dr. Kennicott shows that it is quite distinct from simple purpura. The subcutaneous hemorrhages are said to be due to thrombosis of small vessels, as in blood-poisoning. This is looked upon as consistent with the rheumatic condition; for in rheumatism the blood, as we know, is hyperfibrinous, and thrombosis in even large veins occurs during life, and abnormal coagula after death.

Chorea.—That there is some connection between chorea and rheumatism is generally admitted. Many cases, however, of chorea can not be traced to rheumatism in origin. Attacks of rheumatism may alternate with attacks of chorea. A rheumatic neuritis of nerves in the vicinity of the inflamed joint may develop, and pain, numbness, or prickling may follow. The muscular atrophy which sometimes follows a rheumatic inflammation of the joint is occasionally attributable to the associated neuritis.

Diagnosis.—Difficulty is sometimes experienced, especially in young children, in discriminating between acute osteomyelitis and acute articular rheumatism, particularly when the former is multiple or in the vicinity of the large joints. The intensity of the pain, the extreme sensitiveness of the bone, and the typhoidal symptoms are of especial importance in the diagnosis of osteomyelitis. Secondary inflammations of the joints occurring in the various infectious diseases are preceded by the characteristic symptoms of these diseases. In gouty arthritis in adults the small joints, especially the great-toe joints, are usually affected; pain and redness are more considerable; sweating is absent; the fever is slight; the swollen, tender joints, the profuse sour sweating, the mere attitude of the adult patient, lying still and motionless, afraid to move hand or foot, are in themselves almost sufficient to distinguish arthritic rheumatism. In children, however, we rarely see this extreme typical arthritic form. It is not common in older children even before the age of puberty; in very young children it is unknown. The diagnosis of rheumatism in early life, when arthritis is at its minimum and fever and sweating are not pronounced, is often very difficult, and in many cases it is only by a complete and careful survey of the whole history of the patient that a correct conclusion as to the nature of the attack can be obtained. If the articular affection is distinctly manifested, that is, the tender, painful, swollen joints with a faint blush of redness on them, perhaps, the tendency to sweat-

ing, the rise of temperature to from 100 degrees to 103 degrees Fahrenheit, the shifting of the inflammation from joint to joint, declining in a few days and then reappearing, are characteristic. When tenderness and swelling are slight, confined to one joint, or there is merely a little stiffness in a tendon, it may be difficult to decide whether the affection is really rheumatic or not, although the mere existence of such symptoms in a child is very suggestive of rheumatism. Such conditions are usually rheumatic, and are, it is to be remembered, genuine rheumatism, bearing with them all the possibilities of cardiac inflammation. The discovery of a fibrous nodule, or the rash of erythema, or a mitral murmur, or pericardial or pleuritic friction, or that the patient has had a previous attack of rheumatism in any form, or inherited a family taint of it, will solve the question. All these points should be minutely inquired into, and every case carefully examined day by day to insure a correct diagnosis.

There are two affections which are said to have been mistaken for acute rheumatism. One is infantile paralysis, and the other, in adult cases, pyemia. In case of paralysis in a child, it may be distinguished by the flexed muscles, the helpless rolling of the limb on movement, the pitiful inability of the child to move except as it is lifted with the hand, and the absence of any sign of heart affection or other rheumatic symptoms. Pyemia in adults is distinguished by the hectic sweats and temperature, by the existence of some local suppuration, and by the course of the disease.

Scrofulous affection of the joints is liable to be mistaken at the outset; but by its steady, unshifting character it is distinguished from rheumatism.

Always in the case of children, whether unmistakable arthritis is present or there is merely a stiff and painful tendon, or an unexplained febrile attack, or chorea, or tonsillitis, or erythema, it is most essential to bear in mind the possibility of having to deal with rheumatism, and to examine the heart carefully day by day; discover, if possible, any cardiac murmur or a friction sound betraying an endocarditis or pericarditis, which has never even been suspected, its presence not being suggested by any marked fever or ordinary sign of rheumatism.

Prognosis.—The prognosis of acute rheumatism in a first attack is favorable. The general direct mortality, according to statistics, is only about three and a half per cent,[1] and it is probably less in children than in adults. Fatal cases are due to some of the complications which have been enumerated.

Treatment.—The principles upon which a case of acute rheumatism with arthritis should be treated at the outset are, first, to prevent fresh chill to the surface; secondly, to keep the affected parts at rest, so as to lessen the flow of blood there and the friction of the parts, and thus to lighten inflammation and relieve pain (this applies not only to

[1]Senator, in Ziemssen's Handbuch, vol. xvi, p. 50.

the joints, but to the heart especially); thirdly, by specific remedies to modify, if possible, the fever and neutralize the irritant effects of the rheumatic poison on the fibrous tissues of joints and tendons; fourthly, to prevent, if possible, the inflammation of the endocardium and the pericardium, or if this has set in, to minimize and arrest it, and lastly to relieve pain directly by anodynes if necessary.

In acute rheumatism the patient should be dressed in a soft flannel nightdress, sleep between all-wool blankets, and be carefully protected from draughts of air. In most cases the diet should be restricted to milk, *when milk agrees,* or to raw eggs, with barley, oatmeal, or other gruels, the food being given in moderate quantities and at short intervals. Farinaceous food may be substituted for milk; Mellin's or other similar food is often of service. As the disease advances, the diet should be made more sustaining, but *too* highly nitrogenous food should be avoided until convalescence is assured.

The affected joints may be treated with the galvanic current of electricity, the positive pole placed over the inflamed joint or tendon, but *never* the negative pole; give the strength that the patient can bear without *too* much pain, and very soon after the treatment the pain is relieved, and the redness and swelling abate. The seance should be not less than fifteen to twenty minutes to each joint. The positive pole is to remain about five minutes on each side of the joint, then more to the opposite side, etc., till the joint has been treated as above prescribed. The negative pole may be placed at some distant part. The treatment by the galvanic current is a tedious process, but usually two or three treatments, with the salicine medicinal treatment, will soon give relief. The galvanic treatment may be given once or twice a day. The affected joints, after the treatment and all the time, should be kept wrapped in wool batting (cotton batting does very well), and should be kept as quiet as possible by the means of sandbags, or a close and well-fitting splint, not tightly bandaged.

Various local applications have been prescribed by different authors, which I shall mention. The application of cold in the form of water-dressing is advocated by Senator, or of ice by Esmarch, but of this practise I have had no experience. The application of blisters has been highly recommended for the relief of pain. Simple warm water, concentrated solution of sodium-bicarbonate (1 to 10 of water), or diluted tincture of aconite and laudanum, saturated solution of ammonium chloride, or Fuller's lotion (sodium carbonate, six drachms; tinctura opii, one ounce; glycerine, two ounces; water, nine ounces), are among the effective lotions. (Fitz.)

Another plan which has been highly commended for the relief of pain is the hypodermic injection of a one per cent solution of carbolic acid under the skin over the affected joints, and the application of carbolized oil (1 to 15).

There are two, more or less, specifics for the treatment of acute rheumatism. The older of these is the use of alkaline potassium salts.

In carrying out this alkaline treatment for adults, one ounce of the potassium salts dissolved in at least one pint of warm water is to be divided into equal doses and given during the twenty-four hours. As the potassium citrate is converted in the system into potassium carbonate, it is much less disagreeable to the palate and less irritating to the stomach than the carbonates; hence it is preferred.

The citrate of potassium may be given in lemonade; the lemonade assists in its action; it must be taken in dram doses in half an ounce of lemon-juice put into a glass of water for each dose, and diluted at the time of taking with carbonic-acid water from a siphon. After from three to seven days it is necessary to lessen the dose of the potassium salt, on account of its depressing influence. (Wood.)

We have had more experience with the salicylic-acid treatment, or salicylate of sodium, or oil of wintergreen. The ammonium salicylate or acid salicylate may be administered in capsules. The sodium salicylate may be administered in cold water with the white of an egg dropped into the solution, which prevents nausea and is not disagreeable to the palate. It rarely ever fails to bring down the temperature and relieve the pain of rheumatism in the course of twenty-four to forty-eight hours. But there are several drawbacks to its use. Because it sometimes sets up nausea and vomiting, it has a depressing effect upon the heart, the pulse loses strength, and the first sound of the heart becomes faint when it is given in large doses. It produces ringing in the ears, slight deafness, and vertigo. In large doses it may cause violent delirium, albuminuria, and collapse. These results occur much less frequently in children than in adults; yet in view of the proneness to heart affection in the young, it is well to use a depressant drug with great caution. The salicylate of sodium is the best preparation. Given in small doses to children with joint affection accompanied by fever, it will reduce the temperature more quickly than any other remedy. Give the salicylate of sodium for the first twenty-four hours, then replace it with salicine as a substitute; for salicine has little if any of the evil properties of salicylate of soda, due probably to its very gradual passage into the circulation, and producing its effects more slowly. Salicine is highly recommended in all cases except the most severe, then preferably the sodium salicylate, which may be given from two to five grains every three or four hours to a child five years of age, mixed with water and syrup of orange.

The salicine should be continued in less frequent doses for some days after all symptoms have ceased, or a relapse is liable to occur. These remedies will serve the purpose of reducing the temperature and the arthritis, but unfortunately they seem neither to prevent the occurrence of carditis nor to arrest or modify it when developed. According to recent statistics of the Collective Investigation Report, alkalies should be given in combination with salicine, and salts of soda in preference to those of potash, as being less depressant. The dose—equal parts of salicine, salicylate of soda, and bicarbonate of soda—is from

six to ten grains. The amount of alkali must be regulated by the state of the urine; enough should be given to keep it neutral or slightly alkaline. If, however, endocarditis or pericarditis come on, the salicylates or salicine should be at once stopped, and the alkali given in freer doses, ten to fifteen grains every four hours, with half a drachm of syrup in half an ounce of water. In severe cases of endocarditis and distress, quinine should be given in addition, in doses of two to three grains every four hours for a child five years old. Where the fever runs high, and where there is palpitation and cardiac dyspnœa, this may be given in ten-grain doses of citrate of soda, two grains of quinine, and five grains of citric acid, or acid hydrobromate of quinine may be given every four hours alternately with the alkali. This salt is extremely soluble (ten grains to one drachm), so that the dose can be administered in a single teaspoonful of water; and it has also the advantage of being less liable to cause sickness than the sulphate. Adults may increase the dose of the above for like conditions to suit the age.

Many other drugs have been used in the treatment of rheumatism, which are much less useful, and some of them harmful or even dangerous. Among the latter may be mentioned antimony, aconite, and veratria; all of these are heart depressants, which makes their use negative in this disease, especially in children. Colchicum has not the same specific influence in rheumatism as it has in gout.

Iodide of potassium is quite insufficient; when given with salicylate, it seems, according to the report in the Collective Statistics referred to, to retard the effect of the salicylate. Nitre and lemon-juice have been highly extolled, but have proved to be distinctly inferior to salicine, the salicylates, and alkalies. Antipyrine, given in cases of high temperature, has proved to be beneficial in reducing the temperature, given in doses according to the age of the patient; antifebrine, also, is said to be useful, equally as good results following its use as that of antipyrine. The writer has never had any experience with this remedy in rheumatic cases. We see reported cases of serious syncopal attacks occurring in adults, and I should hesitate to use them at all freely with little children.

Salol is recommended by some practitioners, and others condemn its use. The writer has found it beneficial in joint affections in consumptive cases, giving satisfactory results. In endocarditis or pericarditis in children, when the action of the heart is rapid and turbulent, one to two drops of tincture of digitalis may be given every four hours to a child five years of age for twelve to twenty-four hours, after which time it may be given only two or three times a day. This remedy must be administered with caution; it is a dangerous remedy when there is much pericardial effusion, or if the heart is thickened, with an adherent pericardium. When the palpitation is due to feebleness or dilatation, digitalis has great power to steady and give tone and force to the cardiac contraction. While stimulants should be avoided if

possible in dilatation and palpitation of the heart, yet sometimes it is necessary to use a little wine or brandy when signs of heart failure appear. In such cases they may be given freely to the amount of three ounces of wine and one and a half ounces of brandy in twenty-four hours. Alcohol is wonderfully well borne by children; and it is to be noted that it produces little or no excitement, but acts rather as a sedative. A remedy of immense value in most stages and forms of rheumatic fever is opium. It may be required to ease pain and restlessness and produce sleep. It is recommended to be given freely in doses of one to two minims every four hours for a child five years of age, if there is no concurrent pneumonia or bronchitis. The vomiting which sets in at the close of pericarditis should be combated with ice and small doses of hydro-cyanic acid and soda, with nutrient enemata for twelve hours, taking no food by the mouth. If chorea is severe, bromide of potassium and chloral hydrate may be given in four-grain doses in sweetened water every four hours, according to age, till drowsiness comes on.

When the temperature has been down for a week, iron should be administered for the anemia, which, as has been stated already, is so marked in the rheumatism of children. The citrate of iron in doses of three to five grains with ten grains of citrate of soda and syrup of ginger or orange, in half an ounce of water, should be given as a precaution against relapse, especially in cardiac inflammation; or citrate of iron and quinine, two to four grains, to suit the age, with citrate of soda or potash, may be given in the same way with lemon-juice or syrup of lemon. If the anemia is extreme, or the chronic symptoms persist, arsenic should be administered with the iron, *Fowler's solution,* one or two drops of liquor potassii arsenitis, put in two drams of wine of iron, night and morning after food. This is said to be the most efficient of all drugs in the restoration of red blood-corpuscles. It should not, however, be prescribed until all symptoms of active inflammation are over; for it stirs up hyperæmia in the skin and mucous membrane, as evidenced by the redness of the conjunctiva and tongue, and the flushing of the skin produced by full doses of the drug, and it may presumably affect fibrous structures and serous membranes in like manner.

The erythema goes with the subsidence of other symptoms, and requires, as a rule, no special treatment. Tonsillitis yields to salicylates and salicin with great readiness.

The diet in cases of rheumatism depends upon the general constitutional condition. When the temperature is raised, and acute symptoms are present, it should consist entirely of beef tea and broths with milk, *if it agrees,* and raw eggs. In cases of great anemia or prostration, Valentine's meat juice is recommended by some authors, or even raw-meat pulp, if it can be taken; these should be given as blood restorers. As the fever declines, light pudding, bread and butter, and tea may be permitted; and the patient may soon take fish or meat.

Large quantities of sugar should be withheld, as it tends to favor

lactic fermentation. The patient should rest in bed for at least ten days or two weeks after all acute symptoms abate, so as to insure against a relapse or a chill, and extreme quietness prevents cardiac disturbances.

Prevention.—A child who has ever had acute rheumatism is prone to a recurrence of the disease. As age increases, however, the tendency gradually becomes less. A child born of rheumatic stock has also a special liability to rheumatism. In both cases precautions should be taken to protect those who are thus predisposed from overheating, chill, and overfatigue, the great causes of rheumatism. To this end the child should not be kept too tenderly, but should be out of the hot, close rooms, should live in a cool and even temperature, should wear woolen next the skin, while the body is hardened by tepid salt-water baths and vigorous friction. In case of accidental exposure to cold or wet, brisk exercise should be taken until a full glow of warmth is experienced, and damp clothing changed at the earliest moment. Sudden changes of temperature should be carefully avoided, and when overheated the body should be protected against chill by extra covering until it cools down again. Damp air, cold soil, and variable climate should be avoided if possible. When circumstances permit, the rheumatic child should be removed to a dry, warm climate, with sandy soil, in a situation not overcrowded with trees, exposed to sunlight, and with a free circulation of air.

CHRONIC RHEUMATISM.

Chronic rheumatism is rare in children, much more rare than in adults. It is to be distinguished from the relapsing form of acute rheumatism, where fresh exacerbations of a mild kind, sometimes nothing more than a stiffness and vague pains without swelling, recur from time to time. But in certain cases affections of the joints, such as effusions or ankylosis, do remain in chronic form after an acute attack. The writer had two cases of chronic rheumatism of a long formation in the muscles and tendons of the ankle joint, rendering the movement of the ankle painful and difficult. Both patients were born of rheumatic parents. I remove each bony mass with the galvanic current of electricity, with very high amperage, to the strength of making a scar on the bony mass. The current must be applied by placing both poles on each side of the mass very close against the growth, for at least ten minutes in a place; move the poles the second time in order to treat the affected part all around. It may be necessary to use cocaine in order to give a current strong enough to stop the growth; then nature soon absorbs. In one case I gave only six seances, two a week. The other was given a dozen treatments; in each case the galvanic current was *perfectly* effectual. In each case I prescribed a constitutional treatment of iron and iodide of potash, put up in comp. syr. sarsaparilla, given in small doses. For very chronic cases, in addition to the galvanic current of electricity, baths are very beneficial. Hot springs of any kind afford the most hopeful treatment. Hot brine baths are use-

ful in many cases, or the simple warm baths are used for the promotion of absorption or relief of pain. Wrapping the joints in wool impregnated with linseed oil and a little carbolic acid and oil of turpentine, which keeps up a mild constant stimulation, is an excellent plan in most chronic cases. Pine oil alone is recommended by some writers, being useful in slighter cases. Tincture of iodine, as a counter-irritant, painted over the joints, has been used with considerable benefit in many cases. Stimulating liniments are also very useful. The following liniment has proved useful in the writer's hands:—

℞: Oil wintergreen.....℥iv
Tinct. aconite.....℥ij
Ol. capsicum.....℥iij
Tinct. opii,
Tinct. belladon., aa.....℥iv
Tincture arnica, ad. q. s.....℥viii

M. et sig.: Shake the bottle before using it. Apply night and morning over the seat of pain; then put on wool or cotton batting. Massage and electricity are good in all forms of chronic rheumatism.

GONORRHEAL RHEUMATISM.

A title applied to the occurrence of symptoms of acute articular rheumatism, but due to gonorrhœal infection. Especial importance is to be attached to the occurrence of such symptoms from infection by gonococci, from the close resemblance which they bear to the symptoms in rheumatic fever.

Etiology.—Petrone and Kansmerer have shown, by the repeated recognition of the presence of gonococci in the fluid from inflamed joints, in the pus from the tendon-sheaths, by their presence in the disease valves in acute ulcerative endocarditis (Leyden), and their discovery by Councilman in myocardial abscesses, that such a disease exists. Olser records that gonococci were cultivated from the blood of a patient with a malignant endocarditis, and others have reported the presence of gonococci in the blood. Men are oftener affected than women, and urethral or vaginal gonorrhœa is the usual means of affection. Gonorrhœal ophthalmia and vulvo-vaginal catarrh in infants and children may also be followed by gonorrhœal rheumatism.

Symptoms.—There is said to be no essential difference between the symptoms of acute articular rheumatism and those of gonorrhœal rheumatism, with the exception that in the latter they are less severe and more obstinate. The disease may be indicated by fleeting pains in the vicinity of the joints without fever, or by moderate redness, swelling, and pain of one or more joints, with slight elevation of temperature. In other cases sudden inflammation of the joints occurs, with severe pain and marked swelling, especially in the knee-joint, but with moderate fever. The symptoms usually extend over a period of weeks or months, with exacerbations and remissions and passible complications,

as endocarditis, pericarditis, pleurisy, or entritis. The local inflammations ordinarily terminate in resolution, but when suppuration takes place, adhesions may occur, with permanent deformity. The prognosis is said to be generally favorable.

Diagnosis.—In obscure cases (in adults) of gleet, a gonococcal cause for the rheumatic symptoms may be overlooked; and a gonorrhœal cause may be assumed for the rheumatic symptoms provided a recent infection has occurred. It is stated that in general fewer joints are affected in gonorrhœal rheumatism, the fever and pain are less extreme, the swelling persists longer, and anti-rheumatic treatment is of but little avail.

Treatment.—The Hot Springs in Arkansas are undoubtedly very beneficial in chronic cases. The hot mineral baths and the climate seem to have a decided curative effect upon such cases. The galvanic current of electricity, with very high amperage, does aid in the cure of the disease. It should be applied through the joint by placing an electrode on both sides of the joint, and treatment should be given from fifteen to thirty minutes to each joint. It must be given as strong as can be borne. It may be given daily at first, later on every other day. Wood states that in the acute cases, rest, fixation of the joints by splints, and blisters, or the application of thermocautery over the joints, constitute the major part of the treatment. The writer has found the galvanic slight chemical blister to be very beneficial. It may be necessary to apply a twenty per cent solution of cocaine to the joint by means of absorbent cotton dipped in cocaine and laid over the joint; place the electrodes over the cotton; in this way, the current can be borne strong enough to blister. The joint may be treated all around and on top; the electrodes must be moved over the joint till every part of it has had the action of galvanism. In chronic cases the administration of tonics, with good food, careful attention to hygienic surrounding, and the use of massage and passive movements, is necessary for the cure of these cases.

Local treatment of the genito-urinary organs (see gonorrhœa in women) may be persevered in. The surgical treatment of inflamed joints by opening and irrigation, is said to have yielded satisfactory results.

CHRONIC ARTICULAR RHEUMATISM (CHRONIC RHEUMATIC ARTHRITIS).

Definition.—This is a chronic disease of the joints characterized by slow inflammatory and degenerative changes of the articular structures, and leading to distortion and other deformities. It is most frequent in adults after middle life. It occurs at all seasons of the year. Men are more prone to the disease than women. Garrod states that he has seen it in its severest form in children of ten and twelve years of age.

Symptoms.—In children, as a rule, the disease exhibits no special features. It is associated with the smaller joints of the extremities.

It begins in the same way as in adults, with fugitive articular pains, then stiffness; especially after the joints have not been moved for some time, as during the night or the first thing in the morning, they will be found stiff and sore on moving. The pain and stiffness are more pronounced and more severe in wet weather, also in low foggy weather. The stiffness is not noticed much in the middle part of the day, but becomes persistent towards evening. Acute exacerbation of the joint may occur, associated with slight fever, making rest necessary. The longer the inflammation persists, the more likely are the joints to creak on motion, and the degree of motion is more and more impaired. The extremities are often flexed in various degrees; the rigidity is only partially overcome by passive motion, and in extreme cases the sufferer is bedridden, and often extremely emaciated. Several joints, both large and small, are usually affected in adults, and the symptoms of the disease rarely disappear. Complications are rare.

Diagnosis.—It is extremely difficult to distinguish rheumatoid arthritis from the more chronic or subacute forms of genuine rheumatism until the characteristic deformities have been developed. When the enlargements of the joints, the crepitus on movement, the wasting of muscles, the thin, glossy skin, and the distortion of the fingers arise, there is no difficulty in confirming the true diagnosis.

Prognosis.—Cases of this kind are so rare in children that but scanty means of forming a judgment as to its course and issue are available. The prognosis is said to be more favorable in a child than in adults. But in the more severe forms, rheumatoid arthritis is as persistent in children as with adults, although it can be modified by treatment, and is attended with no immediate danger to life.

Treatment.—Everything which tends to improve the health—good nutrition, warm, dry, sunny climate, and warm clothing—is of the first importance. The affection being especially associated with enfeebled general health, all lowering or drastic purgative treatment is useless and positively injurious. Mistakes have been made in the diagnosis of rheumatoid arthritis, and a low diet, purges, alkalies, and colchicum prescribed, on the supposition that the disease to be dealt with was true gout, or genuine rheumatism, and detriment to the patient resulted; and, on the other hand, generous diet, good tonics, and hygienic surroundings soon improved the patient's condition remarkably. The joints in rheumatoid arthritis will not improve under irritating treatment, as blistering or strong stimulating liniments. Gentle rubbing and exercise of the joints keeps them from stiffness. The galvanic current, using the positive electrode over the seat of affection and the negative pole some distance from the positive, is very beneficial in preventing stiffness. It should be applied two or three times a week. In some cases of poor constitution, iodide of potash and arsenic are effectual,—three grains of the iodide of potassium and two or three drops of Fowler's solution of arsenic, to be taken night and morning after meals. For children, Wampole's cod-liver oil may be advantageous. But the

hot baths and hot, dry-air treatment are beneficial in many cases. Hot sulphur baths are beneficial. The natural warm sulphur springs are the best, but if circumstances will not permit of the patient going to these springs, a sulphur bath made by adding four ounces of sulphur or sulphate of potassium to thirty gallons of warm water, often answers the purpose sufficiently well. Strumpell very strongly recommends hot sand baths. Hot salt baths, followed by Swedish movements, are very useful in most cases.

CHAPTER XLIII.

CHOLERA, OR CHOLERA ASIATICA.

Definition.—This is a contagious disease, produced by the coma bacillus of Koch, capable of being transported from place to place, and under favorable circumstances, endowed with the power of rapid multiplication, both within and without the human organism. It is characterized by violent serous purging and cramping, rapidly followed by collapse.

Etiology.—Asiatic cholera is endemic in India. It is said always to exist in India; indeed, apparently it is the chief instrumentality in keeping down the surplus population, having, according to Annesley, between 1817 and 1884 destroyed eighteen millions of Hindoos. Cholera travels with the people. "In 1884 Koch discovered the cause of cholera, an actively motile, flagellate, curved bacillus, the 'comma bacillus,' which is about half the length of the bacillus of tuberculosis and is considerably thicker. According to the observation of Hueppe, frequently two small, spherical bodies form in a spiral thread, and continue to increase in number until the whole thread is resolved into minute round cells, cohering by a jelly. These so-called 'arthrospores' resist desiccation and other injurious influences much better than does the comma bacillus, and under favorable circumstances develop into the comma bacillus. They appear, therefore, to be a permanent form of cholera organism, and it is probably through this influence that the disease is spread. The cholera organism develops rapidly in sterilized water, in milk, and various organic solutions, provided these be not acid. It is easily destroyed by various bacteria, by acids, by germicides, and by a temperature of 130° Fahrenheit. It exists in immense quantities in the alvine discharges of cholera patients, and has been detected in drinking water, milk, and various foods. The comma bacilli are never found in the blood or general tissues, although they enter the epithelial cells and basement of the intestines. As the comma bacillus exists in the human body only in the primiæ viæ, escapes from the human body only with the alvine discharges, and is capable of producing cholera when injected hypodermically, infection must take place through the mouth. For such infection it is necessary for drinking water, food, or other medium of transmission to become contaminated, directly or indirectly, with the alvine discharges." (Wood.)

Symptomatology.—The incubation period of cholera varies from a few hours to as many days, according to the stage, character, and rapid-

ity of the attack. Clinicians who have treated this disease have generally recognized four stages: First, of premonitory diarrhea; second, of serous diarrhea; third, of collapse, algidity, or asphyxia; fourth, of reaction. It is said that in most epidemics of cholera, perhaps the majority of sufferers experienced the so-called premonitory diarrhea, yet observers have repeatedly noticed its general absence. And, again, it is stated that where such diarrheas have been widely prevalent, common experience has shown that only a comparatively small percentage develop into recognized choleraic attacks. If the premonitory diarrhea indicates a genuine invasion of the organism by the specific infection of the disease, certain it is that there are many grave and fatal attacks without its presence. But it is in the experience of all who have had much to do with epidemics of cholera that any one of the recognized stages of the disease may be wanting. It therefore seems unwarrantable, on the ground of its frequent absence, to exclude the first stage of premonitory diarrhea as a part of the real disease. Some authors think that from the therapeutical standpoint it is wise to treat this stage as the commencement of the attack of cholera, which, if neglected at this time, may ultimately have a fatal termination. If the diarrhea is not controlled, it may, after persisting for hours or days, be followed by epidemic, or the commencement of the attack of the dreaded disease. It is during the night that this onset occurs in the majority of cases. The second stage is the symptom which, with its usual accompaniments of intense thirst; nausea or vomiting; cold, shrunken, wrinkled skin; sunken eyeballs; husky voice; weak, frequent pulse; great prostration; restlessness; anxiety; and cramps, by far the most frequently marks, both for the family of the sufferer and for the physician, the commencement of the feared attack. If the diarrhea has been present, the alvine discharges undergo usually a striking and more or less characteristic change, and often become much more copious and frequent. Up to this point the disease has been essentially localized, and the intensity of action of the specific poison has fallen upon the lining of the intestinal canal. The intestinal epithelia lose their functions and vitality, and desquamate in flakes.

With the desquamated flakes of epithelia, the lumen of the intestines now contains serous fluid exuded from the paralyzed capillaries. The intestinal contents are free of bile, resemble a more or less thick meal gruel, or macaroni, or rice-water, and the alvine evacuations present the well-known appearance of such material, but often somewhat foamy, and they are strongly alkaline in reaction. Besides the symptoms above indicated, any of which may be wanting or but slightly pronounced, there is more or less suppression of the urine. It is said while serous diarrhea is customarily an exceedingly prominent symptom in cholera infectiosa, yet there are genuine cases of the disease where it is totally absent, the so-called cases of cholera sicca, dry cholera. In these cases, although there may be no diarrhea at all, the autopsy shows almost invariably an enormous quantity of the grumous fluid retained in

the intestinal canal, which it distends. Moreover, instead of a colorless material there may be a yellowish or even a bloody tinge, and there may be a certain admixture of ordinary intestinal contents. The intellect is generally clear.

The third stage of serous diarrhea, or rice-water discharges from the bowels, with the accompanying symptoms, lasts for a variable period of two or three to several hours. Reaction may occur at the end, or, what is more frequently the case, collapse may set in. In this stage vomiting ceases, the serous discharges are interrupted, or the contents of the intestines dribble away unceasingly and involuntarily. The heart almost stops its pulsations; the thickened blood almost ceases to flow; respiration becomes extremely shallow, slow, and irregular; aphonia is complete, as also is anuria; the surface is cold as marble, and livid, especially that of the orbit, nose, lips, fingers, and toes. Even the tongue and breath are cold. This stage may last for several hours, to end in death or reaction. It is said, notwithstanding the striking coldness of the cutaneous surfaces, the temperature of the rectum is higher than in health, and in some cases is greatly elevated; the patient is usually sensible of the most consuming internal heat. And if death supervenes during these stages, the temperature of the corpse may ascend several degrees above the normal body heat, and remain there for some hours.

The fourth stage of reaction succeeds that of serous diarrhea or of collapse. In the most fortunate cases, convalescence begins at once, and proceeds regularly to the rapid restoration of health, with the appearance of bile and of normal fæces in the intestinal canal. But if there has been great destruction of the intestinal epithelia and of the subjacent connective tissue of the mucosa, there may be prolonged anæmia, with all its usual sequences, or there may be a long-continued series of digestive derangements, and in either a very tardy reestablishment of health; or the patient may unfortunately pass into a typhoid condition of reactionary septic fever.

Complications and Sequelae.—Various cutaneous eruptions, as utecaria, erythema, or roseola, develop during the period of reaction in about four per cent of the cases. More serious are the pneumonias and other pulmonic complications, which are not rare. Convalescence is usually protracted, and most always accompanied by dyspepsia and often by rebellious diarrhea. Neuritis, tetany, especially after childbirth, furunculosis, and glycosuria, are among the sequelæ which occasionally are said to occur, besides those already noted, according to the character, gravity, and rapidity of the attack.

The mildest forms of cholera are those which are known as cholerine, which are without the development of the stage of collapse or typhoid reaction. The term foudroyan is applied to those exceedingly rapid and grave cases which run their course from beginning to end in a very few hours. In cholera toxica there seems but little evidence of localization of the initial attack upon the intestinal canal, but the

nervous centers and great internal organs are quickly overwhelmed with toxic quantities of the poison.

Diagnosis.—During an epidemic of cholera every case of serous diarrhea should be considered as one of cholera, and so treated with the utmost care. So far as symptoms are concerned, there is no difference between cholera, cholera nostras, and various metallic poisonings, notably the antimonial and arsenical; the finding the comma bacillus is the only complete evidence to base the diagnosis upon.

Prognosis.—"In the beginning of an epidemic of cholera the mortality usually ranges from forty to even seventy per cent; but as the epidemic progresses, either because the pathogenic agent loses its virulence, or because it is the most susceptible who are first attacked, the fatality steadily diminishes. In individual cases, prognosis must always be guarded, since the mildest form of diarrhea may suddenly develop an irresistible force, while, on the other hand, it is not rare for patients to react from the most desperate conditions. During the period of reaction any irregular symptoms or any appearance of cerebral or pulmonary complications is of the gravest import. The very young, the very old, the alcoholic, the insane, and persons weakened by previous chronic disease, all die in large proportions."

Prophylaxis.—From the nature and life history of the cause of cholera, it is obvious that absolute shutting out of the germ by quarantine will be necessary to prevent the spread of the disease. Absolute cleanliness will aid in arresting the spread of the disease, but will not atone for carelessness in allowing the escape of the germ. In no other disease is personal prophylaxis so effective as in cholera. For personal infection it is necessary that the germ be taken into the mouth and into the stomach, so that theoretically it is possible to live in daily contact with cholera patients without evil results. The precaution requires absolute vigilance in every care and respect; there must be no weakness in any point or particular manner, as it may nullify the value of the whole procedure. The hands and finger nails must be kept free from contamination by frequent washings. They should be kept trimmed close to prevent the lodgment of the comma bacillus. The bedding and clothing must be thoroughly washed and disinfected. (See Typhoid Fever.) The food must be eaten directly after it has been disinfected by fire. The diet should be restricted to meats, hot bread, hot cakes, or hot toast, and such articles as shall come from the fire directly to the table, and be eaten as hot as can be borne by the palate. All indigestible food should be avoided. No water should be taken except that which has been boiled and is still hot, or that which has immediately been taken out of bottles into which it was put before the epidemic. It is essential that all dishes be heated before serving the food. Some years ago, we see it recorded, a violent outbreak of cholera in the insane department of the Philadelphia Almshouse was arrested within twelve hours, without the precautions just spoken of, by the free administration of sulphuric-acid lemonade. The only new case

was that of a man who refused the prophylactic. In the surgical wards of the same institution the acid was used from the beginning of the epidemic, and in these wards, although in no way isolated from the other departments, there was absolute freedom from the disease. The hygienic condition of dwellings and their surroundings should be made as perfect as possible. All decayed animal or vegetable matter should be removed. The cesspits and privies should be kept clean and free from odor by the use of unslaked lime or large quantities of copperas.

When a person is suffering from an attack of the disease, the evacuations from the stomach and bowels should be immediately disinfected. The dejecta and vomited matter should be passed into a vessel containing a quart or more of a strong carbolic-acid solution, one part of acid and twenty of water, and immediately after the evacuation a sufficient amount of the disinfectant should be added to make the whole quantity equal to the bulk of the evacuated material; the whole should be stirred gently, and afterwards allowed to stand for ten or fifteen minutes, when it should be emptied into the pit or privy. The privy should contain plenty of unslaked lime. Bichloride of mercury is preferable to carbolic acid,—one part of bichloride of mercury to one thousand parts of water. Immediately after removal the clothing and bed linen should be disinfected, by being soaked for an hour or more in the bichloride solution or carbolic-acid solution, one part to twenty, or they should be immediately boiled after removing them from the patient. The arms, hands, and mouth of the patient should also be immediately washed after an evacuation, with bichloride of mercury solution for the arms and hands, and sulphuric, used diluted, to wash the mouth. The hands of the attendant should also be washed with a weak solution of bichloride of mercury. Under no circumstances should the attendant, or any one else, eat in the sick-room; no person who has been in direct contact with the sick or with any of his personal effects, should eat without first thoroughly cleansing and disinfecting the hands.

With regard to a healthy person exposed to the infectious principle of the disease, all irregularities of personal habits should be avoided, either as to time of meals, occupation, exercise, or hours of sleep; all emotional excitement should be removed; in short, every circumstance which experience has shown may exercise a disturbing influence upon these important functions should be carefully guarded against. The use of articles of food which are liable to disturb the digestive apparatus must be avoided. The child should be carefully shielded against intemperate weather; it is all-important that the functions of the skin should be kept regular and active by a sufficient amount of clothing suitable to the season of the year. Cold baths should be avoided. Particular care should be taken that revulsions of blood, produced by chills, from the cutaneous surface to the internal organs, especially the abdominal, may not occur, and in connection with this it is strongly recommended that a broad flannel band be worn during sleep, because through restlessness the child might become exposed

while sleeping. Sponge the body with tepid water, drying quickly with a coarse, soft towel. A child should on no account be permitted to occupy the same bed with a sick person, and should be kept as much as possible from the sick-chamber.

Treatment.—During an epidemic of cholera, every case of diarrhea must be treated with the greatest care, and most cases can be arrested before the cholera bacillus has full possession of the alimentary canal. Put the patient to bed, and confine him to a special diet of meat essences and strong broths, and give the doses of aromatic sulphuric acid, for an adult as follows:—

℞: Acidi sulphurici aromatici.....f℥ij
Ext. hæmatoxyli..... ℥iij
Syr. zingiberis.....f℥jss
Misce et adde.
Tr. opii camphorated.....℥jss

Sig.: Dessertspoonful for an adult; give to child dose suitable to age.

In many cases it may be necessary to diminish the amount of paregoric, and increase the amount of syrup of ginger proportionately. It is recorded that washing out the bowels thoroughly with distinctly acidulated water has proved beneficial. Hayem recommends lactic acid, five drams in twenty-four hours, in cholera, or as a prophylactic a dram and a half used daily, well diluted, in divided doses of four, in twenty-four hours. The aromatic sulphuric acid has an advantage on account of its astringent action. Naphthol, strontium, salicylate, bismuth subnitrate, and other intestinal antiseptics should be used freely. Bismuth salicylate is particularly commended by some French authors.

But the enteroclysis of tannic acid, introduced by Professor Cautani, of Naples, and so frequently used by Italian physicans during the recent cholera epidemic in Italy, would seem to afford the greatest reliance in the treatment both of the premonitory diarrhea and of the active stages of the disease. If a slight attack of seemingly simple diarrhea does not yield at once to rest in bed and the administration of a dose or two of warm infusion of chamomile, to which chlorodyne or laudanum has been added in proper quantity, suited to the age of the patient, at proper intervals; then recourse should be had without loss of time to the warm enteroclysis of tannic acid. This enteroclysis is essentially an injection into the colon per rectum, through a long rubber tube, of a considerable quantity of warm water, containing a certain percentage of tannin, as follows:—

℞: Boiled water or infusion of chamomile..2 litteri
Tannic acid.....5 to 10 grains
Laudanum.....30 to 50 drops
Powdered gum-arabic..... 50 grams

The temperature of the mixture should be blood heat. The quantity to be injected should vary with the age of the patient and other

circumstances according to the judgment of the attending physician. The most convenient time for administering the injection is immediately after an evacuation of the bowels.

In the language of Ramello, "If all of those who suffer from diarrhea in time of cholera would at once have recourse to tannic enteroclysters, the grave cases of this disease would be very rare." But so often the physician is not called in time to use this highly-recommended prophylaxis. When the patient is first seen, he has generally passed far towards a collapse, or is already in a stage of collapse, when the system is nearly overwhelmed by the quantity of the poison already absorbed from the intestinal canal and by the excrementitious substances retained in the economy through failure of the liver and kidneys to perform their excretory functions, and when neither the substances swallowed per mouth nor those injected per rectum, are longer absorbed.

In this desperate condition, the warm bath, repeated every hour or two, is said to be of some benefit. But it should be supplemented by an attempt to restore to the tissues of the body the large quantities of the fluids which have been lost, and to wash out from them some of the excrementitious substances which have been eliminated. The patient should drink very freely of hot water with or without alcoholic stimulants, as it is most acceptable to the stomach. External heat should be used freely to the extremities. Filling the bowels full of hot water, not too hot, has been practised as far back as 1832 by Lizars. Tannic acid added to the hot water was found by Cantani to be the most effective. Hayem's formula for a saline solution to be injected into the cellular tissue of the buttock (instead of throwing it direct into the saphenous vein, as recommended by some authors) consists of one thousand parts of distilled water to five parts of sodium chloride and ten parts of sodium sulphate. The injection is slowly made by means of a fountain syringe, to which the instrument for injecting the fluid is attached. A large quantity can then be taken and rapidly absorbed. Then the part should be deadened with ethyl chloride before passing the instrument into the tissue, thus causing no pain to the already suffering patient. The process can be repeated until the desired result is secured or the method proved to be useless.

Professor Cantani suggests, as the most successful time for resorting to hypodermoclysis, the first indications of insufficiency of water in the body, such as discoloration of the skin, cramps, coldness, that is to say in the beginning of the algia period. The formula for the fluid used by Cantani for hypodermoclysis is for an adult, as follows:—

℞: Pure sodium chloride.....80 grams
Sodium carbonate..... 6 grams

Dissolve in 2 litres of boiled water.

The quantity to be injected each time varies, according to circumstances, from one to two and one-half litres. The temperature of the

solution should be 38° Centigrade, unless that of the rectum be very low, in which case it has sometimes been raised to 43° Centigrade.

The apparatus required is very simple. One of the best forms consists of an ordinary fountain syringe having a long elastic tube, to the distal end of which is attached a fine-pointed metallic canula, supplied with a stop-cock. The operation is as simple as the apparatus. The region preferred is either the mammary or the ileo-costal region. A fold of the skin is raised, and the canula, previously filled with fluid, is inserted quite a distance between the skin and the subjacent fascia. The fountain of the syringe is elevated until the fluid begins to flow by gravity. In fifteen to twenty minutes one to two litres can be thus injected. During the process the current should be interrupted at intervals by means of the cock. Upon withdrawal of the canula after completion of the operation, the tumor should be gently rubbed, when the fluid will very soon be absorbed.

The warm bath also, in conjunction with hypodermoclysis, appears to exercise a powerful influence upon absorption.

After hypodermoclysis, hypodermic injections of stimulants, often so urgently called for, especially during the stage of collapse or rigidity, become active, while they have before been inert. If after a first injection the coldness and the wrinkling of the skin persist, and the secretion of urine is not reestablished, if, in a word, we are convinced that the tissues are not yet supplied with the water which they have lost, repeat the operation some hours later.

"In the majority of cases, however, after the first hypodermoclysis, if the internal losses have not been such as to be incompatible with a good reaction, the circulation is reestablished, the avenues open, bathed once more with their natural fluids, and show an expression of consciousness. Little by little the lividity of the skin diminishes, and the voice becomes normal. In less than an hour, a person who was at the mouth of the grave is restored to life."

In summarizing the treatment Cantani says: "First period of cholera: Rest in bed, warm infusions with laudanum or chlorodyne and cognac, warm bottles to the feet, warm general baths, warm tannic enteroclysters—certain cure.

"Second period, specific or rice-form diarrhea: Always warm baths, lemonade acidulated by chloro-hydric or tannic acid, with laudanum, spirituous liquors, warm tannic enteroclysters, lumps of ice swallowed —cure almost certain.

"Third period, vomiting, diarrhea always more profuse, cramps and coldness, commencing cyanosis: Hypodermoclysis and baths, alternated with tannic enteroclysis, hypodermic injection, revulsives externally—very many cures."

In the stage of typhoid reaction the skill, judgment, experience, and watchfulness of the physician are taxed to the utmost. It should always be borne in mind that we have to do with *a fever of septic character* consequent upon extensive abrasion or destruction of the mucous

surfaces of the intestinal canal, and complicated by serious involvement of the liver, of the kidneys, sometimes of the blood, and of the general nervous system; hence great care should be observed in the selection of the line of treatment to be followed.

Prognosis.—The mortality of cholera infectiosa is known to be sometimes frightful. It is usually greater in the earlier course of the epidemic, and it is limited almost entirely to those who neglect to invoke the aid of the physician until the attack has become exceedingly grave. Send for the physician in the early stage, and the danger of a fatal issue is not so great. If in practise enteroclysis and hypodermoclysis meet the claims made for them, as above stated, the disease will be robbed of many of its terrors.

CHAPTER XLIV.

MALARIA.

Definition.—By malaria is meant affections which are due to a specific poison, produced by the presence in the human body of a peculiar hæmatozoon. These affections have been divided into various groups, which have been characterized by the type of fever that accompanies them; in this way we have the intermittent, the remittent, and the continuous forms. It has been found that well-marked attacks of malaria exist without the production of fever, so that forms occur in which the symptoms may be of any one of these types, that is, intermittent, remittent, or continuous, without being characterized by an elevation of temperature.

Etiology.—Malarial diseases are not contagious, and do not pass from one person to another; they are the outcome of a poison which is produced outside of the body. This poison results from a suitable soil, an abundant moisture, and a sufficient heat. These conditions are widespread; malarial districts are found throughout the world. Heat of climate, as a rule, increases the virulence of the poison in the infected districts, so that the most deadly malarial countries are tropical or subtropical. The character of the soil necessary for the production of malaria is not thoroughly understood. It is probable that there are organic or inorganic constituents of certain soils which inhabit the growth of the malarial organisms, and therefore render healthful a certain swamp in an infected district. The amount of moisture in a soil has immense influence; if a tract is covered all the time with even a very shallow depth of water, it is almost innocuous; if it is alternately exposed and covered with the changes of the tide, it may be very dangerous; but the most deadly of all localities are those in which, without there being water upon the surface, the ground water reaches close to the top of an alluvial soil containing much organic matter. It was such a soil that in the famous Walcheren campaign in 1809 put twenty-seven thousand out of forty thousand English soldiers into the hospital. As a rule, great fresh-water lakes, and the deltas of rivers and the country around, are abundant producers of malaria. The damming of rivers and the draining of marshes are powerful factors in increasing the production of malaria. Cultivation of the soil has been observed to lessen in some way its productive power, so far as malaria is concerned. It is noticed that in the production of malaria changes take place which are not easily accounted for. In the New England and the Middle United States it is clear that there has been a great

decrease of malaria; whereas it is asserted that about the ports of the Gulf states the disease is, on the whole, increasing. Can this be due to the importation of fresh, extremely virile germs from the tropical islands and mainland? It is affirmed that malaria has disappeared from Lake Ontario; and in the northwestern states it is almost unknown.

Age has little or no influence upon the susceptibility to malarial poison, and instead of an attack affording protection against the disease, it renders the subject much more liable. Nor is there, so far as is known, any heredity in susceptibility; the white races at least do not become accustomed to the disease, but in fact degenerate in the face of a persistent, overwhelming malarial poison. On the other hand, it is said the negro races and, to a less degree, the Arabs also, enjoy almost an immunity. The late summer and the early fall are the seasons of greatest danger.

Malaria is more a disease of the country than of the town. In thickly-populated cities the conditions are not favorable for the development of the germ; but it is not true that complete protection is afforded even in the most thickly-populated city. Heavy fogs in the country and the moist air of night favor the rising from the ground and the dispersion of the malarial poison. Moreover, owing probably to mechanical reasons, high elevation above the earth affords protection, and the obstruction of a high wall or a dense wood may be sufficient to alter distinctly the malarial relations of a certain place. High winds may carry the germs to a considerable distance.

In 1879 M. Laveran, a French army surgeon, announced the discovery of a hæmatozoon, the germ of malaria. In 1883 Marchiafava and Celli published their researches, which eventually led them to accept, as the cause for malaria, the so-called plasmodium malariæ. "This plasmodium" can be produced by a variety of poisons acting upon the red blood-corpuscles of typhus and scarlatina and in progressive anæmia. It is said, however, that these researches still require verification. (Rosenstein.)

Pathology.—This poison may act in two ways: first, generally; second, locally. Its general effect may be summed up as that of almost any foreign substance introduced into the circulation,—the production of chills, fever, etc. This series of symptoms is preceded by a period of incubation, which, according to different authorities, may vary from a few hours to a few years; but the average number of cases is represented by two weeks. The local effects are due to an especial development of virus at given places, as the spleen, the liver, the brain, the blood-vessels, etc. The effect of the poison upon the blood is a destruction of red corpuscles, an increase in pigment (directly depending upon it), and a diminution in albumen. The effect upon organs or tissues in which the poison or its results are lodged is the production of irritative changes leading to hyperplasia or hypertrophy. With the above data in view, the lesions are readily understood. Of all the organs in the body, the spleen suffers earliest and most. During an attack the

spleen is enlarged; when the fever disappears, as a rule the spleen returns to its normal size; it enlarges again upon a return of the fever, and finally it becomes more or less permanently enlarged. This enlargement is due to hypertrophy and the deposit of pigment. Frequently there is inflammation in the capsule, sometimes peri-splenitis. The liver also becomes enlarged, like the spleen. This enlargement is due to a similar process, but is characterized by an enormous deposit of pigment.

The disintegration of red blood-corpuscles gives rise to an almost endless number of changes. The lymphatic spaces around the vessels are filled with pigment, so that the contours of the vessels are emphasized, as in the brain. On account of nutritive changes in the blood, the vessel walls frequently become weakened, and then hemorrhages follow, under the skin, into the cavities of the body, or with the secretions. Digestive disturbances are likewise noted.

Local disturbances, of great importance to the pediatrician, are quite common in the bronchial tubes, so that it may happen that the patient survives his attack of malaria, but succumbs to catarrhal pneumonia, the sequel to malarial bronchitis. In the pernicious forms the lesions are splenic enlargement, changes in the brain, hemorrhagic infarctions, etc. It is seen that there is hardly a tissue or organ in the body which may not be attacked by this malarial poison.

Symptomatology.—The paroxysms of an intermittent fever may come on suddenly, or they may be preceded by malaria, anorexia, or other general prodromes. The attack presents itself in three different forms, namely: first, the chill; second, the fever; third, the sweating. In the first stage there is a coldness in the back, which soon radiates over the whole body, and is accompanied with horripilation, which the writer has seen become so violent that the teeth chattered, and the body trembled sufficiently to shake the bed on which the patient lay. The skin is pale, cold, and has a goose-flesh appearance. Vertigo, cephalalgia (headache), ringing in the ears, trouble of vision, dilated pupils, vomiting, abundant urination, and frequent small pulse are common phenomena. The bodily temperature begins to rise at the very onset of the attack, so that before the chill is over 104° or 105° Fahrenheit may be reached and the surface be extremely hot. The eyes are brilliant, face congested, pulse strong (perhaps dicrotic); there is violent headache, and often great and varied nervous disturbances, such as mental confusion, unrest, and even delirium. As a rule, in from three to four hours, but in some cases eight to ten hours, the dry skin breaks out into a profuse perspiration, which is followed by a rapid fall of the temperature to 98° Fahrenheit, and usually in from two to four or more hours the subject has apparently recovered his normal condition. In some cases the spleen is somewhat enlarged and tender during the fever stage, which abates after or during the sweating stage.

The so-called quotidian type presents itself daily. The tertian

type recurs every other day; the quartan type, every third or every fourth day.

There are also double forms,—double quartan, for instance, in which there is an attack on two successive days and one day without an attack, or double quotidian or tertian. In double quotidian we have two chills daily, one in the morning, one in the evening; in double tertian, one chill daily, the time of the chill alternating every other day. In children the quotidian form is the most common. The attack most usually comes on between ten o'clock in the morning and one in the afternoon. It will be understood that this is the rule in the great majority of cases; there is no time in twenty-four hours when a chill may not come on, but for practical purposes it is best to assume that an attack will follow the rule, and not the exception.

Authors differ very much as to this rule,[1] and possibly the time when the infection has taken place, or the method of infection may have something to do with the different observations that have been made. If anything has been established, it is the liability to relapse. (Forchheimer, M. D.) The time of relapse has been the subject of very much discussion. Children are more liable to relapses than adults, and, depending upon the type of the attack, relapses are most common on the seventh, the fourteenth, and the twenty-first days. This is true especially of the quotidian and tertian forms. The quartan form has a tendency to relapse on the eighth day, although changes of type from quartan to tertian or quotidian are by no means uncommon.

There are two forms of the intermittent type, the pernicious and the mild form. In the pernicious form, which is not rare in infancy and childhood, the patient is taken sick suddenly; the child has been perfectly well, and suddenly may go into convulsions. Before this, the parents may have observed that the child is restless, that it has assumed a bluish-pale color, perhaps that it has vomited, or has had one or two loose passages. Upon examination, it will be seen that the child is well nourished, with a temperature very high, up to 104 degrees to 108 degrees Fahrenheit, in the rectum. Perhaps you will find nothing but an enlarged spleen, and this is not constant by any means. The convulsions may continue, the patient being soporose or comatose; the pupils are contracted, or one is dilated and the other is contracted; lividity occurs over the whole body; the extremities get cold; and this first attack may end fatally. As the convulsions gradually diminish in intensity and number, the extremities grow warmer, the bluish color disappears, the temperature begins to fall, consciousness returns between the convulsions, and towards evening the child seems comparatively well. The same kind of attack may come again the next day, either weaker or stronger, usually the latter, and may then end the patient's life. Or the attack may come on simply as an attack of coma in an otherwise healthy child, from which condition the

[1] Virchow and Bohn, loc cit.

patient never rallies, lying for from one to three or four days, and then dying from asthenia, œdema of the brain, or other complication. The convulsive form may leave the child in this comatose condition and the termination be in the same way as in the case where coma sets in immediately. Rarely do these pernicious forms terminate in the development of the benign intermittent, and the prognosis is almost invariably a fatal one. It is difficult to make a diagnosis with certainty in the absence of any positive symptoms. The importance of searching for the *plasmodium malariae* in these forms can not be too strongly dwelt upon.

In the benign forms of chills and fever we must carefully discriminate almost entirely between the separate conditions, the one occurring in infants and the other occurring in older children. In infants we rarely have a complete attack, *i. e.,* one made up of a chill, fever, and sweat; it is either one of these alone or most commonly two together. The one thing in the infant which is most commonly missing is the chill; the one which is always present is the fever. Bohn and others state that very young infants do have chills. In malarial districts in the country in the southern states, physicians see young infants shake with a true chill produced by malaria. The child begins to yawn or stretch itself as if it were very tired; the face changes in expression and color, and has a pale, pinched look. The nose especially is pinched and cold; the eyes sink in, and have bluish lines about them; the lips are blue, and the little one is very tired-looking. The fingers and toe-nails become cyanotic, and if this occurs after a meal, the patient vomits or feels nauseated. All this is a mild manifestation of a chill. The next thing we see the involvement of the nervous system, twitching of the eyelids or of the extremities, associated with what has been described above, which causes the physician to fear the developing of convulsions. A great many infants have convulsions at the onset of any acute affection, and frequently we find that in intermittents the chill is represented by convulsions, which are followed by the next stage. The convulsions naturally cause very great anxiety, because in and of themselves they are very dangerous, and for this reason at first the physician does not know but that he is dealing with something very much more serious than an ordinary attack of chills and fever. After the convulsions have ceased—and they do this, as a rule, after a short time, not exceeding a few hours, the first one being usually the severest—then comes the period of fever. During the chill period the temperature has gone rapidly up to 103° to 108° Fahrenheit (rectal), and remains there throughout the whole period of fever, sinking very gradually towards the end of this period, and after from three to five hours reaching normal or subnormal. With this fever there is more or less restlessness, the patient is very much flushed, feels very dry, is fretful and cries, and, as in the previous stage, may have gastro-intestinal disturbances. The sweat that follows is profuse when it does occur; but although the little patient seems exhausted,

the appetite returns, and the child seems perfectly well. However, after one or two attacks—and this is true of older children as well—the cachexia begins to manifest itself. The patients lose their natural color; they are pale, sometimes jaundiced, listless, languid, having lost their appetite, and do not take much interest in their surroundings, as has been their custom. With this the spleen becomes enlarged. It is rare not to find the spleen enlarged in the malaria of children, according to the authors upon this subject,—Emmet Holt, Schneidler, also, in the "Archives of Pediatrics." The intermittents of older children do not differ materially from those of adults. They are able to describe their sensations, and they react like adults.

MANIFESTATIONS IN THE NERVOUS SYSTEM.

Not a nerve in the whole body seems to be exempt from affection by malaria. In the cerebro-spinal system of nerves the symptoms manifest themselves as neuralgias. The fifth pair of nerves is the one most commonly affected. There is supra or infra-orbital neuralgia, frontal or occipital headache, pain in the teeth, and sometimes alongside of the nose. Neuralgias of the sciatic nerve, the intercoscal nerves, and the nerves of the stomach are by no means uncommon. Another form is called wry-neck, or torticollis intermittents. There are three states of this condition, the first being purely torticollis, the second absolutely intermittent with high fever or continuous, and the third with brain or cord complications, presenting the picture of a cerebro-spinal meningitis. The patient is attacked at a certain time of day with a pain in the back of the head and along the upper part of the spinal column. With this there is torticollis. The attack lasts for from two to five or six hours, and then the patient feels perfectly well. This is the mildest form. The next day the attack repeats itself, and resembles in every respect an ordinary intermittent. The forms above described may run into one another, and, although at first very amenable to treatment, may develop so as to be beyond control.

There are also disturbances of the vasomotor nerves which cause peculiar symptoms. Among these special reference is made to intermittent swellings, more particularly about the joints, and sometimes within them. They give rise at times to great pain; at other times they are painless.

AFFECTIONS OF THE RESPIRATORY ORGANS.

The whole of the respiratory tract, from the mucous membrane of the nose to the alveoli of the lung, may suffer from malarial poisoning. Sometimes we observe true intermittent attacks of coryza, or, combined with this, enlargement of the tonsils. One alone or all combined may exist. The most common form of catarrhal trouble due to malaria is a subacute or chronic condition extending over the whole mucous membrane of the pharynx, nose, and eyes. We also have attacks of epis-

taxis. These may become dangerous to life on account of the great loss of blood during the attack, or on account of repeated attacks. It is advisable to examine the nose in these cases; for frequently it will be found that there is a peculiar ulceration upon the septum, which should be treated. Attacks of bronchitis more or less diffuse, as the only symptoms of malarial infection, also occur. If they are in the capillary bronchi, they may become very dangerous. As it is, they must always be carefully watched, and the patient be given the full benefit of liberal treatment.

MANIFESTATIONS IN THE ALIMENTARY TRACT.

Very few intermittent cases occur without some symptoms being produced in the alimentary canal; but complications have been treated of before, and we now refer to those forms in which the symptoms on the part of the alimentary canal are the principal manifestations. The stomach, the small intestine, and the large intestine, either alone or together, may be the seat of disturbance, which alone goes to make up an attack. The stomach symptoms are dyspepsia, either constant or intermittent. These attacks are entirely independent of any food that is taken. The child may be fed in the most correct manner, and yet the attacks continue. That form which manifests itself in attacks of vomiting is very peculiar. The child may be in perfect health, playing about, happy and jolly, when it is suddenly taken with the ordinary symptoms of nausea. Then vomiting comes on. After four or five hours the child, although looking dragged out, seems perfectly well; its appetite returns, and it remains perfectly well until the next attack comes on. With this there may be a slight elevation of temperature (101° to 102° Fahrenheit); the spleen is usually enlarged, as it is in every form of malaria in children; and when these attacks continue, the little patient suffers very much so far as general health is concerned. All the symptoms coming from the alimentary tract in malaria are most easily controlled by quinine.

On the part of the intestines we have diarrhea. This is of two kinds,—the large and watery stools, and the small, slimy, bloody ones. The attack consists simply in having these stools. There is no pain, as a rule, except in the large intestinal variety. The patient does not suffer inconvenience; and after the attack is over, he feels perfectly well. The diagnosis of these gastro-intestinal forms is readily made; the fact alone that all the remedies which usually control diarrhea, combined with proper diet, fail, is sufficient to cause the practitioner to suspect that he is dealing with malaria. The prognosis is favorable in all forms. It must not be forgotten, however, that there may be deeper lesions present in the intestines, which may lead to very unpleasant complications,—tuberculosis, peritonitis, etc.

MANIFESTATIONS IN THE CIRCULATORY SYSTEM.

It seems from all observations that attacks on the part of the heart are more rarely noticed. They must be rare or more cases would be recorded in the literature of malaria. An irregular distribution of blood is noticed in that form in which vertigo, with congestion of the face, is the only symptom. This dizziness is the only thing the person complains of, but it returns with the same regularity which characterizes all these forms. Another form is attacks of palpitation of the heart, which is also easily controlled by quinine.

MANIFESTATIONS IN THE URINARY ORGANS.

Special manifestations of attacks in the urine are hæmaturia or albuminuria or glycosuria. In reference to the first we notice the appearance of blood in the otherwise normal urine. This blood is discharged with or without pain, according as it coagulates in small or large masses, is usually of a bright red color, and its loss does not affect the patient very much. The urine always contains albumen in variable quantity. The cases, as a rule, are of slow recovery, but the prognosis is not bad. Quinine does not act as a specific; in other words, these cases are not affected by the use of quinine, but removal to a non-malarial climate gives relief in a very short time.

MANIFESTATIONS IN THE SKIN.

No proof has been offered that there exists any relation between skin disease and these affections of malaria.

Troubles in the mouth are common in chronic malaria, from the simple stomatitis to cancrum oris, the latter sometimes ending the life of a cachectic subject.

Diagnosis.—The diagnosis of an ordinary malarial fever is easy, but in irregular malaria it may be misleading. If paroxysmal disturbances of any character recur at not very long intervals with show of regularity, malarial disease should be suspected, and an examination of the blood be made, or the effect of quinine be determined. If sufficient doses of quinine fail to influence the paroxysmal disturbances, the probabilities are altogether against such disturbances being of malarial origin. There is a continued type of fever which prevails in the southern states, and it is affirmed by various practitioners that it can not be arrested by quinine.

The most common forms of paroxysmal fevers simulating malaria are those of septicæmia and hepatic disease. If there is no organism detectable and no response to quinine, the case is said not to be considered malarial. In looking for malarial organism the practitioner can obtain most satisfactory results by the direct examination of fresh blood. A thin cover-glass freshly cleaned with nitric acid, then with alcohol, and finally with ether, receives a very small drop of blood from

the end of the finger or the lobule of the ear, and is placed upon a thoroughly cleaned glass slide. The blood will spread into a thin layer by the weight of the cover-glass, and should at once be examined with the aid of an oil-immersion lens. The parasites may be seen with a dry lens of high power, but best results are obtained only with the immersion lens. (Wood.)

Prognosis.—Malarial fever is always curable; if at once recognized and properly treated, it never ends in death. In tropical countries malarial diseases, especially if reenforced by continued exposure to the cause, may end fatally.

Prophylaxis.—There is no absolute protection from malaria, but much can be done by those who must expose themselves by obeying the simple rules: First, avoid going out in the early morning or during the evening or night, especially when the weather is in any degree foggy; second, sleep in the second or third story of the house; third, take from five to ten grains of quinine either directly after breakfast or on going to bed at night. This applies to people who have malaria, and who live in a malarial district.

Treatment.—The ordinary paroxysm of intermittent fever requires no treatment, other than that, upon recognition, the patient should take a full dose of calomel and podophyllin, and in the morning an adult may take from fifteen to twenty-five grains of quinine, so administered that the first dose shall be taken from eight to ten and the last dose from four to five hours before the expected recurrence of the paroxysms. The exact amount of quinine given should depend upon the known obstinacy of the malaria of the district. To the adult in the northern states, twenty grains are given; for the south, thirty grains are recommended. The second day the quinine is repeated in smaller doses, according to the effects of the first administration. The paroxysm having thus been broken, the patient should be put upon Fowler's solution, from three to six drops after meals, and no more quinine given until the seventh day, at which time the malarial paroxysm has a pronounced tendency to recur; to prevent this recurrence, from fifteen to twenty grains of the alkaloid should be administered every seventh day for from four to six weeks. The quinine must be given in solution or in capsules, or in fresh pills of the bisulphate. Old sugar-coated pills are not to be trusted; they are not prompt.

When the malarial paroxysm takes on an irregular form, brouhague, for example, larger doses of quinine are required to put it aside, so that from twenty-five to thirty-five grains should be given in the intervals, and repeated in ascending doses until complete control is obtained.

The treatment of a pernicious malarial paroxysm is a matter of the greatest importance. Amyl nitrate will at once put an end to the chill in an ordinary malarial paroxysm without in any way interfering with the after-development of the fever and sweat. It is thought probable that the drug will prove of service in the algid form of pernicious malaria in bringing about reaction. If the central temperature

during a pernicious chill is low, the hot bath should be used. When there is a distinct hyperpyrexia (a very high fever), cold affusions may be used about the head, neck, and arms; while at the same time external heat and mild sinapisms are used freely on the extremities. If heart failure is threatened, a free use must be made of digitalis, hypodermically, with strychnine and cocaine. No time must be lost in producing a profound cinchonism, in the hope that by destroying the forming crop of parasites the paroxysms will be diminished. If the stomach can not be employed, a well-assidulated (tartaric acid) rectal injection of thirty grains of quinine bisulphite may be administered, while ten to twenty grains of the bisulphite are given hypodermically. Two hours later, if relief has not come, the rectal injection should be repeated. At least seventy-five grains of quinine should be given within eighteen hours after the first coming on of the paroxysm, and cinchonism should be steadily maintained for a week, to be followed by the free use of Fowler's solution, with iron and other tonics and the weekly doses of quinine. (Wood.)

The successful treatment of chronic malaria is often one of great difficulty. Experience has shown that quinine has much more influence in these cases if given along with drugs which act upon the emunctories; in some cases potassium bitartrate does good, and a bitter purgative, such as small doses of aloes given daily for a length of time in such doses as will produce soft stools, is often of the utmost service where there are heptic congestion and enlargement. Mercurials, nitrohydrochloric acid, and ammonium chloride may be necessary before success in chronic cases can be reached. In obstinate cases arsenical preparations are valuable (Fowler's solution). Iron and simple bitters may be freely administered—all the stomach will bear. Removal from malarial districts is often necessary. In bad cases of malarial anemia it may be essential to put the patient to bed, and even sometimes to enforce a modified rest-cure. When the spleen is chronically enlarged, iodine ointment may be used externally over the organ, while solid extract of ergot is given in full doses, from twenty to thirty grains a day, in capsules.

The Treatment of Malaria in Children.—The administration of quinine to children is no easy matter, where quinine must be given in large doses to break up some forms of malaria. A great many children can not bear it upon their stomachs. The normal dose for intermittents that we use is as follows: For a child below six months of age, one to two grains; from six months to one year, two to two and a half grains; from one year to two years, two and a half to three grains; from two years to five years, three to five grains; and from five to twelve years, five to eight or ten grains, depending upon the size, the strength of the patient, and the return of the affection. Quinine can be administered by one or all of the methods used in giving drugs,—by the mouth, the rectum, the skin. There is no known method by which the bitter taste of quinine can be effectually disguised that can

be made applicable to the administration of sufficiently large doses. Liquorice is the best vehicle, the syrupus liquoritiæ. We need it most in children from three to five years old, just where it can not be used on account of the large quantity of the liquorice required. When the child can swallow pills, this mode is preferred. In giving quinine by the rectum—in which way it works just as promptly as per mouth, but requires a double dose—two ways are open to us, by injections and by suppository. It must be confessed that the latter method is much more satisfactory than by the injection. For an injection, suspend the quinine in sweet cream or any bland fluid, as flaxseed tea, or an emulsion of sweet-oil would undoubtedly do as well. The suppositories can not contain over five grains each; this size would be sufficient for infants, but two or more would be needed for larger children. The quinine should be mixed in cocoanut butter made into suppositories. Great care should be taken in mixing the quinine properly, as the quinine has the power of crystallizing on the outer surfaces, thus causing them to irritate the intestinal mucous membrane. The hypodermic injection is necessary in cases where all the other methods fail, or where it is necessary to get quinine into the system as quickly as possible, as in cases of the pernicious form. The great objection to its use in this way is that it produces abscesses. However, it is better for the patient to have an abscess produced in this way than to lose his life, although if proper antiseptic precautions are used, the danger of an abscess being thus formed is by no means certain. No substitute has been found for quinine; but the remedy next in importance is arsenic. This is most applicable to the chronic forms, and is to be administered between various doses of quinine, which are given to prevent relapses every seven, fourteen, or twenty-one days; arsenic must be given in full doses, although it is not necessary to produce its toxic effects. It can be given for months at a time, and should be given until we have reasonable assurance that the spleen has returned to its natural size.

In the remittent and continuous forms, quinine does not have any other effect than it would have in any other fever, *i. e.*, that of an antipyretic. The treatment of these forms is simply symptomatic. Those who have dealt most with the continuous forms of remittent fever, prefer to begin the treatment with a mercurial, following this up with quinine in small but frequently-repeated doses. Especially in the continuous forms, the patient should be kept in bed, put upon diet, and watched very closely until the physician is positive that he is not dealing with a mild form of typhoid.

For the treatment of the chronic forms and the cachexia, the child should be removed to a non-malarial region. If the removal is only from one district of the city to another, provided there be no malaria in the quarter to which the patient is taken, the result will be good; mountain resorts are to be preferred. Besides quinine and arsenic, all the tonics have been used; especially iron with quinine produces

very good results. For the affections of the nervous system accompanying malaria, strychnine in very small doses is of value. The enlargement of the spleen will be found to yield to faradization. This method of treatment has seemed to me frequently to give good results, although recent reports do not appear to warrant its use, because of its being unserviceable in some authors' hands.

In all the various neuralgic forms in children, antipyrine frequently acts like a charm, not as a curative, but as a palliative. Acetanilide is recommended to have special control over the neuralgia of the fifth pair of nerves due to malaria. The treatment has to be modified to suit each individual.

Lemon-juice, given in doses of two drachms to a half ounce, twice or three times daily, in some cases certainly produces good results. In others the results have been negative.

CHAPTER XLV.

YELLOW FEVER.

Definition.—Yellow fever is an acute febrile disease, characterized by fever, lasting from one to four days, followed by an intermission, with, in severe cases, a secondary exacerbation, a steady fall of the pulse, which commences during the period of fever, jaundice, a tendency to stasis of circulation and to hemorrhage, and parenchymatous inflammation of the liver, kidneys, and stomach.

Etiology.—The question of the contagiousness of yellow fever has been investigated and discussed most extensively, so that at the present time it seems established that the disease is incapable of passage directly from man to man, but that the poison, whatever its nature may be, passes from the sick into some favorable locality, where it develops the activity which enables it to infect another person. For the growth and development of the poison outside of the body, certain conditions are necessary. These conditions probably are, first, a steady, well-maintained temperature; second, the presence of filth.

It has been a widespread belief that this filth must have at least some animal matter in it, and that excrementitious material is especially fit for its development. It would seem that the most favorable conditions are the existence of high temperature and the presence of such mixed masses of vegetable and animal filth as prevail about seaports. The effect of cleanliness was strongly illustrated in the banishment of yellow fever from New Orleans by the rigid military sanitation enforced by General B. F. Butler during the Civil War.

The usual history of an epidemic is a dirty town, a single imported case, and a resulting outbreak of the disease. In an instance reported by Guiteras, a man moving from an infectious district had fever in his own house, which was kept clean, with no spread of the disease; during convalescence he went to another village and lived in a dirty room, which room became a source of infection for a number of cases. In another case the clothing of a sailor dying from the disease was packed in his chest and sent to his wife in New York; two persons were present at the opening of the chest, and both were infected.

We have no knowledge of the nature of the germ; it is believed, however, to be an animal organism.

Symptomatology and History.—The period of incubation varies from a few hours to fourteen days, although it is very rare for the disease to develop after the ninth day. The invasion, which occurs more frequently at night, is abrupt, with repeated chills, excruciating pains

in the back, head, and limbs, and an immediate rise of temperature. Vomiting is very common, and in some cases an exanthematous rash appears, especially in the sacral regions. There is usually an evening exacerbation of temperature on the first day; but on the second or third day the characteristic fall of temperature begins and continues, though sometimes interrupted by evening exacerbations until it reaches the normal from the second to the fourth day.

During the whole period of the fever there are great anxiety, restlessness, intense suffering, and not rarely delirium, varying in degree from slight mental confusion to wild mania; in some cases there is stupor. The pain disappears when the fever subsides, the mind becomes clear, and not infrequently all anxiety is lost. There remains an increasing epigastric tenderness, with continuing and increasing slowness of the pulse, perchance a little heaviness; soon jaundice appears, first generally in the forehead and conjunctiva, and rapidly increases until the whole surface is dark yellow, and the deep brown urine is heavily loaded with biliary constituents.

The period of remission may end in convalescence, but commonly there is developed a second paroxysm of fever, with well-marked diurnal remissions and sometimes hyperpyrexia. Even during the remission the failure of strength is usually marked; but in the fever of reaction, as it is called, the adynamic system becomes more pronounced. Death may occur during the secondary fever, or, after a prolonged, irregular course, by gradual abatement of symptoms, the patient passes into convalescence. In severe cases the jaundice deepens until the whole surface is uniformly bronzed. The vomiting recurs, and becomes uncontrollable, while brownish or blackish flakes appear in the matter ejected, and increase in number until the whole fluid is black and opaque. The capillary circulation becomes so nearly stagnant that the dependent and extreme portions of the body,—fingers, toes, scrotum, back, etc.,—are deep purplish. The urine lessens in quantity and may be completely suppressed. Hemorrhages occur from the various mucous membranes, even from the gums. Petechiæ vibices, hematuria, bloody stools, and an intense apathy mark the complete degradation of the blood and the failure of the vital power, which deepens until a quiet death results.

While the course of yellow fever is for the most part fairly uniform and consistent, the cases vary in intensity from the mildest to the most severe type. (Fitz.)

According to Guiteras, in young children yellow fever may be a very trivial disease, and even when severe is so lacking in characteristic symptoms that it is commonly diagnosed as an ephemeral or a thermic fever, or as a malarial attack.

The black vomit consists of gastric mucus with altered blood-corpuscles, epithelial cells, bits of food, various fungi, and black amorphous granules, evidently the last result of blood disintegration. The amount of albumen in the urine is usually directly proportionate to the severity of the attack, but it is possible for a case to go on till death

with an abundant secretion of non-albuminous urine. During convalescence, paratitis, abscesses, diarrhea, and other local disorders may be very troublesome.

Diagnosis from the History of the Disease.—Guiteras, M. D., states: "I do not know of any disease with which an ordinary case of yellow fever can be confounded if subjected to observation for two or three days. Yellow fever differs in every particular from the hemorrhagic, the hemoglobinuric, and the remittent malarial manifestation.

"In warm countries the question of diagnosis is complicated by a remarkable liability of children to fevers because they arise from an excessive demand made upon any of the important functions of the body. The function of heat inhibition must be overtaxed in the long summers of the tropics. Short cases of thermic fever will be readily confounded with yellow fever. As a means of diagnosis I can only insist upon the three cardinal points mentioned in the symptomatology, namely, the relation of temperature and pulse, the facies, and the albuminuria."

Prognosis.—Yellow fever is much milder in children than in adults. Among the unfavorable symptoms we should notice an extraordinary rise of the temperature during the fastigium, especially about the time lysis should commence, or when the temperature has already started on the line of descent. If the pulse rises rapidly at the same time, and the temperature reaches a maximum above that of the initial stage, the prognosis is almost necessarily fatal. A slow pulse, if it steadily loses in volume and resistance, is a grave sign, even though the temperature may be following a favorable course. Great agitation and increasing frequency of the respiration are also of very serious import. The suppression of the urine is a grave symptom, though it is more easily overcome in children than in adults. It is the rapid increase of the albumin in the second or third day that constitutes the most alarming symptom. A prolongation of the case beyond the sixth day may be taken as a favorable sign, though the patient may present very alarming symptoms. These are the typhoidal cases, of which the patient generally recovers after a prolonged struggle.

Treatment.—Guiteras, M. D., states: "If cases are taken in hand early, no danger need be apprehended. One is led almost to believe that there must be some great specific which, promptly administered, is sure to exert a decidedly favorable action upon the course of the disease.

"In the treatment of children it will be found that the following measures may be considered as safe for the relief of more or less dangerous symptoms. If the bowels are inactive, cream of tartar should be given. This is preferred by some, to counteract the acidity of the stomach. In older cases, who can take capsules I [Guiteras] often use the compound jalap powder in little laxative doses. If they are easily swallowed, these capsules are almost always retained. They appear to arrest vomiting, and I have continued to administer them at

intervals, in some cases to the exclusion of other treatment—only in such doses, however, as will keep up a moderate activity of the intestinal secretions without griping.

"If the stomach is very irritable, and the food is not retained, calomel should be given in preference to all other laxatives, and in minute and frequently-repeated doses. The admixture of lime-water with the milk, or the administration of small doses of carbolic acid with bicarbonate of sodium, or the use of ice, will often prove a good substitute for the calomel. Cold applications to the head may or may not be soothing; a sinapism to the back of the neck will be found beneficial. Antipyrine and Dover's powders have given decided relief. Either of them may be recommended during the fastigium of the fever in ordinary cases. In grave cases, acetate of ammonium may be given with the tincture of digitalis, to keep up the activity of the circulation. The treatment of the suppression of the urine is often a hopeless task. The tincture of digitalis, as recommended above, will fill this indication, if there is any possibility of filling it. In the more protracted cases, the use of stmulants and the tincture of the chloride of iron may overcome the difficulty. If the complication continues, I would advise calomel as the most certain diuretic to be used. I have seldom employed it in the case of children, because the suppression of urine does not often arise as a pressing indication for treatment, but in the adult the effect of calomel has been very remarkable. In adult cases I have given two or three grains every four hours, in capsule, either alone or in combination with small doses of compound jalap powder. The urinary secretion is started often before the third dose is administered. I used calomel as a diuretic in yellow fever for the first time in the epidemic of 1887. On the recommendation of Dr. Sternberg, the bichloride has been used, with the result of destroying pathogenic microbes in the intestinal contents. There is no proof that the theory has been made good by the experiment. But I am informed by those who used the bichloride that it certainly had the effect of increasing the secretion of urine and diminishing the amount of albumin. I have abandoned the use of the cold bath in the febrile diseases of children. Children under the age of seven years are very apt to show evidences of blood stasis in the cold bath before the internal temperature has been materially reduced.

"As soon as the black atriæ begin to show themselves in the vomited matters, or even before, if the lysis is usually slow and the asthenia marked, we should prescribe the tincture of the chloride of iron in doses of five or ten drops every two or three hours. This treatment is often followed by an arrest of the hemorrhage and diminution of the vomiting. In these cases good brandy should be diluted with milk, water, or carbonic-acid water. In many cases iced champagne is very well borne by the stomach. Special attention should be given to the changing of the clothing and sponging of the body with diluted chlorine water, tepid or cool, as the condition of the patient may require. In

some cases during this stage the jaundice may acquire unusual prominence, and a slight enlargement of the liver will be noticed. I recommended then that the chloride of iron be replaced by chlorate of potassium.

"Upon the judicious use of iron, alcohol, and chlorate of potash, with nutritious diet, depend, in my opinion, the few triumphs that therapeutics may boast of.

"The mortality of yellow fever is considerably reduced when the patients are treated in tents.

"The frequent administration of food in small quantities during the lysis is probably of great importance, and the preference should be given to milk. We may substitute for it, at times, strong meat broths, especially when the time allowed for resting has brought together the hours for feeding and the administration of the iron. Soft-boiled eggs are tolerated even before convalescence is well established. Alcoholic preparations containing extract of beef may be used with advantage in protracted cases.

"The use of cool acidulated drinks is very generally recommended, especially in the early stages. It is stated that if lemonade be boiled and subsequently cooled, it will be better borne by the stomach."

Prophylaxis.—Absolute exclusion of the germ of yellow fever from any locality is an absolute preventive of the fever; hence the importance of a most rigid quarantine, the isolation of the sick, and the complete disinfection of clothing, excreta, etc. It is of the utmost importance that infected districts be immediately depopulated. Keeping away from an affected district is the only prophylaxis.

CHAPTER XLVI.

DENGUE (BREAK-BONE FEVER).

Definition.—Dengue is a febrile epidemic, contagious fever of subtropical countries, characterized by violent muscular and articular pains and a polymorphous rash, and often dichronous, and by a cyclical evolution in four periods, the last being that of convalescence, which is prolonged and difficult. It is, as a rule, not a fatal malady.

Etiology.—Epidemics of dengue have been noted in subtropical Asia, Europe, and America. J. W. McLaughlin states that he has found a peculiar micrococcus in the blood. The disease is immediately contagious. It is said that four-fifths of the whole population exposed take the disease.

Symptomatology.—The period of incubation varies from a few minutes to five or six days (Fayrer) and averages four days (Catholendy). Dengue commences abruptly with very severe aching pains and headache, and usually reaches its maximum during the first twenty-four hours. In severe cases there are rapid pulse, general adynamia, and even nocturnal delirium. Loss of appetite is universal; mucous or bilious vomiting is very common. Very frequently there appears almost at once an erythematic rash, which may invade the mucous membrane, producing redness and swelling of the conjunctiva, of the internal nares, and of the throat. Both large and small joints are affected, and often become swollen and red by the third or fourth day. In from forty-eight to sixty hours a rapid defervescence occurs, often accompanied with critical phenomena, such as colliquative sweat, diarrhea, and epistaxis. At this time in a large proportion of the cases the so-called secondary or terminal rash of the disease develops, which is characterized by its polymorphism. It may be papular or circumscribed, or papular and diffused, or it may be vesicular or pustular. Several forms of the eruption may exist in the same case. Enlargement of the lymphatic glands is not uncommon. A secondary fever may follow the eruption and gradually subside.

In infants and younger children, as Thomas and others have observed, the disease often begins with a convulsion, a child being awakened at night with a spasm. If the child is old enough to speak, it will complain of feeling cold or chilly along the back, and shortly after of headache, rachialgia, and ortheralgic pains. During an epidemic these symptoms should awaken the physician to a suspicion of the disease. The behavior of smaller children, of infants especially, will depend almost entirely upon the intensity of the attack. Sud-

den restlessness, agitation, and manifest discomfort, with constant crying or moaning, and not infrequently repeated vomiting, especially of breat-milk in nurslings, are special symptoms. More serious are those cases in which infant or child, after having had a convulsion, remains listless, apathetic, or in a stupor. In these cases the gastro-intestinal disturbance is more pronounced, vomiting being quite frequent, the vomit usually consisting of ingesta, mucus, gastric secretions, and bile. These cases are almost always associated with high temperature, and will need careful watching. No matter how the attack begins, an indefinable prostration seizes the patient, and fever begins. In an adult the pulse becomes hard and rapid, oscillating between 100 and 120 and even 140 (Twining) to the minute. In younger children the pulse is often so frequent that it is impossible to count it.

The respiration in children is hurried in proportion to the fever. The temperature begins to rise at once, and attains its maximum usually in from twelve to twenty-four hours, rarely after three days, and very rarely after five or seven days.

The fastigium is generally very short, and the defervescence is rapid and characterized by a succession of remissions and exacerbations, which continue until the temperature has fallen one or one and a half degrees lower than the natural heat of the body.[1] During the next few days, if the temperature is closely watched with a thermometer, it will be found that it fluctuates from a degree below to one or two degrees above normal heat. At the end of the sixth or seventh day, there is a very slight rise again, being a secondary fever, but, as a rule, this heat soon subsides, and the temperature remains normal unless there is relapse, which is not uncommon even in the mildest forms.

Relapses.—The frequency of relapses is universally admitted as being one of the distinct features of the clinical career of dengue.

Prognosis.—Dengue almost invariably ends in recovery.

Differential Diagnosis.—"Absolute diagnosis of dengue is exceedingly difficult to establish in the beginning of an epidemic; when once the epidemic has been recognized and admitted, the diagnosis is not so difficult.

"*Treatment.*—This is a self-limited disease, almost always ending in recovery, with rarely a call for therapeutic interference. All medicinal agencies are stated to have been practically *nil*. In the majority of tropical diseases an evacuant medication at the onset seems generally to be followed by good results, and experience has tested the fact that dengue is no exception to this general rule. For this reason it will be proper to begin the treatment of the first stage by administering an emetic of syrup of ipecac, followed after the emesis by a laxative.

"For infants at the breast, aromatic syrup of rhubarb is a very generally-administered and popular laxative. Several large spoonfuls

[1] Dr. D. Aquin, of New Orleans; confirmed by Vauvray, M. D.

of prune tea, sweetened with syrup of manna, will also act efficiently in the same direction, and may be given to advantage to older children where the tea is combined with a few leaves of senna. Cream of tartar or magnesia in lemonade will be found palatable, if iced, even by the most fastidious and difficult children. After the laxative, a hot mustard foot-bath relieves the intense headache of the invasion. For convulsions in infants, the warm mustard bath will be found beneficial, prepared according to Trousseau's recommendations, by simply immersing a small bagful of mustard meal in a tub of hot water and pressing the bag in the water without mixing the meal in the water. Potassium bromide is very effective in diminishing the reflex excitability of children, and will prove more than usually effective in this condition. Wet cups to the back of the neck in marked cerebral hyperemia will greatly lighten and relieve the head-symptoms. Good judgment is necessary in the exhibition of this depletory treatment, which should be reserved for sthenic and plethoric children and adults. Cold applications to the head, iced in summer, with camphorated sedative water, bay rum, or cologne, will always be grateful to the patient. The physician should demonstrate the use of cold water in hot climates in the country where parents are afraid to use cold water, for some mysterious reason. The little patient should be laid across the bed, with its head projecting beyond the edge of the bed, allowing it to rest in a bowl of water mixed with evaporating lotion, ice being also added if the initial headache is very intense. The head should then be gently but freely douched with water. A little shampooing of the head, aided by fanning, will complete the process, and the patient will be made thereby infinitely more comfortable, no matter what age. By this means alone the convulsive manifestations and agitations of many children will be lulled and averted." (Matas, M. D.) Thomas says that in cases of adults exhibiting the rheumatic type, particularly when the temperature runs high, sodium salicylate will be found to be very efficient, safe, and pleasant. Matas states that there is no question at present as to the superiority, reliability, and safety of the use of antipyrine.

CHAPTER XLVII.

NURSING OF SICK CHILDREN.

To a casual observer sick children may seem all much alike in their restlessness, and in their perpetual demand on the patience and care of their attendants, and yet to the practised eye there is every shade of difference in the characters of children, each little child having as strongly-marked peculiarities as adults. The little people demand study and thought on the part of those who attend them; and all who have experience in the care of sick children will soon realize that some education and training are required for those who aim at nursing them successfully. How often do we hear mothers say, who have raised a family of children in which no two are alike, that some of them would have to be coaxed, others ruled with a stern hand, etc.! Even the little babies differ one from another. In the study of these various dispositions or idiosyncrasies, and in the adaptation of means to an end, a real children's nurse sees at once that, though her duties should be performed methodically and with regularity, each child must be the subject of special study, and rules and "red tape" made sufficiently elastic to cover all.

Dr. West, who was a pioneer in initiating a specialty in the treatment of sick children, says in his opening lecture to students: "Children will form at least one-third of all your patients. So serious are their diseases that one child in five dies within a year after birth, and one in three before the completion of the fifth year. These facts, indeed, afford conclusive arguments for enforcing on you the importance of closely watching every attack of illness that may invade the body while it is so frail." The child will not be nursed by any one; it is elective in its tastes, and those who aim at nursing sick children must have the art of winning the child's love and confidence at the commencement. The training of the mother or nurse may be based on the power to observe, to interpret aright these observations, to understand and anticipate the wants of the patient, to comprehend the emphatic but unspoken language of the aspect, manner, cry, posture, etc., of sickness. It must be the first object of the nurse to learn these, or she will fail in her task; and she must also bring to her aid patience, gentleness, cheerfulness, good temper, and self-restraint. The child may be refractory, and she will have to learn how to feed such children; she will have to grasp the method and science of giving food so as to sustain the strength and yet not overtax the digestive powers; she will have the most irritable stomach as well as the most

rebellious ones to deal with; and above all she will sometimes have to harden her heart to the pathetic petition for indulgences or treats. Firmness and gentleness will have to be combined, how to insist, how to win obedience without friction, how to keep the patient quiet under all difficulties and under all circumstances,—these things are accomplished by love and truthfulness. Once win the child's confidence, and then it will yield itself to all demands. Truthfulness must be the watchword, and should be insisted on from all those who have to tend the sick child, even when it wrings the loving heart to speak the truth. It pains the child to be deceived, especially when among strangers.

To see a sick child lie quiet in its crib and thankful to be let alone is touching indeed; and it is this letting alone which is so important in nursing a sick child. The poor mothers in their own homes make quite a toil of their children; they will hardly put them out of their arms, and they will not believe that the child can be thriving unless they are dandling it on their knees; both mother and child are quite wearied. It is the greatest kindness to let the child lie quiet in the crib or cot. The child thrives better and gets a better supply of fresh air. Sick children should not be kissed about the mouth or face. The back of the neck or the hand is the best place to be kissed, but it is better not to indulge in much kissing during any kind of illness. It is difficult sometimes to accustom the child to lie quiet. At first it will be restless, and fret at not being taken up; but when it sees that fretting is of no avail, with the ready adaptability of childhood, it learns to make the best of it, and the little face soon loses the worried look that is so often marked on the faces of children, and a look of happiness and content will be seen.

Children can not thrive in a darkened room. The light and plenty of fresh air should flood their apartment, but must not pour in directly upon them. Children are like the plants in the garden. Plants grow and expand under the rays of sunlight, and we know there can be no doubt that the light has a physiological influence on the growth and development of children, especially in cases of illness. The sick-room should have a southern or western exposure, and a free circulation of air, interchanging with the outer air without making a draught, should be kept kept up day and night, especially in crowded cities.

THE SICK CHILD.

Any deviation from the standard of the child's health affects its sympathetic nature; it at once gives token that there is something wrong, some morbific influence at work. The rapid course of a severe onset of an illness, and its speedy termination either in recovery or in death, are always matters of surprise to those unaccustomed to sick children; hence it requires that the attendants be fully on the alert to catch each new symptom, and be prepared with appropriate treatment.

The mother should not wait until her child's illness has declared itself before she takes action; and even then, as a mild domestic ailment and an acute disease may assume the same symptoms, she should act with judgment and seek some skilled assistance; for however experienced a mother may be, she can hardly read symptoms aright. Or there may be one of the infantile infectious complaints setting in, and then for the sake of other children some system of isolation is necessary.

Usually illness first shows itself in a child by listlessness and loss of appetite; the eyes look heavy; the child may be fretful, especially if disturbed, or it may be drowsy; it will feel hot, and if the temperature is taken, the thermometer will show generally an elevation above the normal. This must not be disregarded, as a very little suffices to disturb the normal heat of the body. In nearly all cases there will be vomiting and some bowel disturbance, and special symptoms will soon be observed. In older children who are able to explain their feelings, the symptoms set in in the same manner, and heed must be given that something is amiss. We usually wait awhile and see what is coming on, watching the child carefully, and placing it in a quiet room and away from other children, giving it light food of easy digestion, seeing that the bowels are not overloaded, and waiting for the diagnosis of the family physician or some good physician.

AGE.

It is to be borne in mind that age has much influence on the diseases of children; that before the age of seven years the body is being built up rapidly, and this means a great expenditure of vital force. From this fact it is easily understood that a small disturbing cause will seriously upset the equilibrium of its powers. It is of more importance to keep a child in health than to restore it from illness to its normal condition; and very much may be done by regularity in all its habits. Appropriate food at regular intervals will aid the digestive powers into strong, healthy action; regular hours of rest and exercise will soothe and strengthen the nerve centers; the muscular powers will be developed by use, and the mental faculties develop themselves in harmony with the animal vigor. Dentition is a certain crisis in a child's life, causing a great many disturbances, and great anxiety to the mother; through this crisis it needs to be carefully steered, and it will pass the teething period in safety. It is a natural process, for which provision has been made in the child's constitution; and if its surroundings and habits are healthful, it will pass through the storm with but little danger. Hereditary defects that are ever present in children will often modify acute disease by their influence. If the mother will study her child's constitution, she can do much to defend the weak points by maintaining a wholesome habit of living. No two children are alike, and they will thrive the best who receive the most individual thought.

The nursery or the child's playhouse, if it is in the country, should by no means be thought of secondary importance; here the child will spend three-fourths of its day, and its surroundings will never die out of a child's life. It is very important that it be bright, cheerful, and clean, and the mother should preside over the children and teach them that order and method should rule their habits. The little ones will then look back upon their nursery days as some of the brightest in their lives.

THE SICK-ROOM.

It is very essential that as far as possible the management of the sick-room should be kept in the hands of one person, so that there may be unity of treatment and that methodical harmony which is of so much importance in sickness; and then if the assistants are obedient, good work may be done. Fidgety nursing does harm more often than otherwise. All unnecessary articles of furniture should be removed from the room, also the hangings from the wall if there are any, and the carpet; have at hand everything that you can that is likely to be needed, as extra basins, cups, small pans for the linen feeders, a supply of hot water for baths, and a ready supply of linen, etc. A good plan, where there is sickness in the country, is to keep all white cotton rags boiled, then rolled up and put away in a clean place for emergencies. Keep all these appliances handy; but they should be kept outside of the room, and also outside have vessels for receiving the slops, so that there may be nothing offensive about the patient. Provide a good supply of some disinfectant in a concentrated form (soda, bicarbonate, chlorate of lime is easily obtained in the country, and let the soda be used freely on the floor, as it has no offensive odor). The lime may be used in the vessels, and for soaking the bed-linen when removed from the patient.

Next is the choice of the sick child's nurse, which is of much importance. We want a steady, reliable woman, who can manage the patient with patience and kindness and firmness, who can be trusted to carry out orders, and yet have a discretion of her own. She must be cheerful and even-tempered, physically strong, cool, and self-possessed in an emergency, and above all with a love for her work and her patient. The mother must frequently have the nursing to do in the country, as trained nurses can not be had. Hence every mother should study how to nurse her children. City mothers have the advantage of trained nurses, which is one of the best earthly blessings. The *wise* nurse will show herself to be a woman of tact and sympathy, will soon infuse her spirit into the members of the family, and they will readily work under her guidance.

The advice to the hospital nurse may as well be applied to the self-trained country nurse. There are many little niceties of method and order that will add to the comfort of the patient. A child with any form of fever is easily washed in the recumbent position on a blanket

or a Turkish sheet, being rolled gently from side to side; in the case of an injured limb it must be steadied with one hand or by a second person, and then there is very little pain or displacement. It is a great husbanding of the strength in fever, especially typhoid, to keep the patient always lying down, and the whole of the person can be properly washed in this way. This is the best preventive of bed-sores, especially in cases of paralysis, where the evacuations are not retained, and enables the nurse to see at once any weakness of the skin. The skin must be completely dried, and dusting-powder liberally used, and then a child can lie for months on his back, provided the sheet is stretched tightly and pinned down, not allowing any wrinkles whatever to get under the child's hips. After the bath and drying the back and hips, it is a good plan to bathe with alcohol, then dry the parts again and apply the dusting-powder. The child's clothing should be so arranged that a physical examination can be made quickly and without undue exposure. Sometimes it is trying for a physician to wait for the nurse to fumble at the strings or buttons, and it worries the child. Before or about the time you expect the doctor's visit, the nurse should have the clothing loosened, and a blanket warming at the stove to wrap the child in, if it is to be taken out of bed. If the child is examined in bed, the nightgown and vest are drawn over the head and placed near the stove to keep warm. This is an important little detail which doctors appreciate, and it is important for a delicate child to be saved the chill of cold garments, especially when tired by the examination. A loose wrap will serve to cover the parts not under examination; have a warm towel at hand if it is the doctor's custom to use one while examining the chest, and be sure it is well aired. Should the doctor prefer to examine the child on the mother's or nurse's lap, a warm blanket may be wrapped around the child, or lay the blanket over the lap where it will be easily adjusted to the doctor's convenience. Sometimes a few moments' time is necessary to win the child's confidence and allay its fears. If no anæsthetic is to be used, it may be best to tell the child that it may hurt a litle bit if instruments have to be used, but they should be kept out of sight, as the sight of the instruments may frighten the child. It is always best to treat children with candor.

Remember, in putting on hot applications, that a child's skin is more sensitive and tender than an adult's (and some adults are more sensitive than others). The child's sensation must be the guide. It is a cruel thing to put on a poultice or a fomentation too hot; it does no good if it burns and excites the child. The physician will usually instruct the nurse how to put on a blister, and how to dress it afterward. After applying any kind of blister, a warm corn-starch poultice, saturated with sweet-oil on the side that is to be laid next to the blister, should be put on, and then covered with absorbent cotton, and afterwards with a bandage. Cheese-cloth or an old linen handkerchief is good to hold the poultice, but it must be very clean. After the poul-

tice has remained on long enough, it may be removed; and with a pair of sharp scissors the blister should be clipped on its lower side, pressing absorbent cotton on a clean cloth just underneath to absorb the water that runs from the blister. Then have at hand a new warm poultice with the oil the same as above prescribed, and apply it over the blister. Dress the blister a day or two or longer till it stops discharging yellow water; then sterilized vaseline may be put on till it heals. If the blister itches very much, it may be bathed in camphor water with a little laudanum in it to stop the itching.

The administering of food or medicine by means of an enema in the same manner is usually prescribed by the physician. All mothers should be well versed in this method, as it is so often necessary in case of diarrhea in children and to check diarrhea. The bulk should be made as small as possible in some instances. To check diarrhea, it will probably consist of corn-starch and some kind of astringent, perhaps opium, and there should not be more than two or four teaspoonfuls of mucilage with the quantity of opium prescribed. If you are going to deal with constipation, it will be large in quantity, such as a pint of soapy warm water, or gruel and castor-oil, or soap and castor-oil; and after the injection has been given, leave the patient quiet until there is a desire to return it. To give the enema for constipation, the tube should be oiled and passed up the rectum very slowly and gently as far as it will go. In giving a nutrient enema, the food must be as concentrated as possible, and be a little thickened with starch powder or arrowroot. Four ounces is as much as the bowel will retain. It is better to first wash out the rectum with a little warm water, then wait about half an hour before giving the food enema.

Mothers who are not trained nurses should remember to save a little of the morning urine for the doctor for testing; put it in a clean covered vessel. The doctor may want a record of the amount passed in twenty-four hours; in such cases a jar or vessel is provided, and then the observation is begun from a fixed hour—say 8 A. M. On the first morning let the child pass the urine at that hour (or any other hour that is most suitable for the nurse), and throw it away; all the water passed subsequently up to 8 A. M. the next morning is to be saved, and the whole quantity is measured, recorded, and thrown away. If the specific gravity is to be taken, the nurse must be shown how to use the little instrument that weighs it, and how to record it, by the attending physician. The evacuations should be saved, and reported as to their condition, and in case of doubt, for inspection. There is a diversity of opinion as to whether diarrhea exists or not. A little looseness is called diarrhea by some. The presence of slime and blood in the stools should be reported at once; also any passing of undigested food. The frequency and the quantity must also be observed and reported, and intelligent answers given to the doctor's questions.

Management in Sickness.—Bad management in the diseases of young children is frequently seen, and yet the medical attendant has

to rely very much for the success of his medicines upon the intelligence and good management of the nurse. Hence the great importance of all mothers acquainting themselves with the rules that govern nursing. The question is, What is to be done with a child who will not take milk, when that is the special diet indicated by its complaint? The popular feeding-bottle with the india-rubber tube is often offensive to the child, because it is almost impossible to prevent decomposition, which will take place from particles of food clinging to the inner side. This will taint the most carefully-prepared food. The bottle and nipple need careful scalding and rinsing, and should be kept in a cold vessel of water between times. In all probability the diarrhea of an infant must be looked for first as coming from the bottle. In diarrhea and vomiting the administration of food has much to do with the recovery; first of all, suitable quantities for digestion must be given at regular intervals and with patience, and it must be freshly prepared. All the vessels used for preparing the food must be scrupulously clean; in fact, there should be one special vessel set aside for the sole purpose of preparing the child's food.

In all diseases of the respiratory organs, the child requires a warm room with an even temperature. But the room must have sufficient ventilation to insure against a stuffy, poisonous atmosphere; and this result can be obtained by keeping the room at a constant even temperature, with a free interchange of fresh air. This requires a little forethought and management, but it can be done. The essential is that the exetrnal air, which is the freshest, should be admitted steadily, and the temperature kept from falling below 60 degrees Fahrenheit. The mother or trained nurse must bring this about by her ingenuity; but it must be remembered that letting in the used-up air off the staircase and passages is not ventilating with fresh air; the air must come directly from outside to do good. It is necessary to moisten the air with steam, and this is best done, for instance in case of laryngitis, by surrounding the bed with some light curtain or screen, and then letting the steam come from some suitable apparatus into the bed near the patient, care being taken that there is an escape from the top of the bed, or the curtains will become damp. A teakettle kept boiling on the stove or near the side of the fire will be found beneficial in all cases of sickness where it is best to have the air kept moistened.

A few hints for dealing with diphtheria or laryngitis are all that will be necessary in this article, as these diseases have been treated in other articles. There are few cases that demand more skilled nursing than diphtheria; and when it is possible an experienced nurse should attend on such cases, especially after the operation of tracheotomy, as careful feeding and watching by an experienced nurse are essential to recovery. The attendant should keep her mouth closed while standing over the patient, and use a disinfectant for washing the hands before taking her meals. A lotion or weak solution of carbolic acid should be put near the bed for washing the sponges, etc.,

that are used about the patient, and all feeding cups, spoons, and glasses must be kept apart. Linen over a piece of waterproof pinned over the neck of a child's nightdress to make a bib, is a clean way of keeping the neck dry; for it must be remembered that the diphtheritic discharges are most irritating to the skin. The nurse's skill, patience, and vigilance will be taxed in dealing with such cases. Her patients will require incessant watching, and will make endless demands on her ingenuity. It is advisable to use clean, soft rags, which can be easily burned. Never use pocket handkerchiefs.

In homes where there are infectious diseases a great deal can be done by way of precaution in the use of disinfectants for the linen and the discharges before they are taken out of the room, as it is in these that the germs of disease are conveyed. A sheet kept moistened with some disinfectant and hung over the outside of the door of the sick-room is very effective. Then of course there should be no intercourse between the occupants of the sick-room and the rest of the household, and the nurse and friends should change their garments before going out. The floor of the sick-room should be swept with sawdust moistened in the disinfectant, and if possible all the dust and refuse should be burned.

In case of scarlet fever in the desquamating stage, it is the practise of some doctors to have their patients rubbed over with an ointment; others say that oil retards the process of desquamation and closes the pores of the skin. I always prescribe a thorough aseptic bath—first sponge with weak carbolized water, then wash with hot water with plenty of soap; or rub the entire body with dampened soda, then sponge off till very clean, removing all desquamation; rub the body till dry and then anoint with cocoanut butter. But whatever treatment the attending physician prescribes should be adopted. The skin must be kept clean by frequent sponging with warm water, and the patient kept in bed until the process is over; remember always to do the sponging under a blanket. Every precaution should be used to keep the dust from the bed from being scattered about.

The desquamation from a case of measles is not so easily dealt with; it starts infection in the early stage, before the eruption has thoroughly developed, and so spreads among a household before it is checked. It is of importance to keep the patient in a warm room, in bed, until the eruption has shown itself. The same rule of disinfection will apply to this disease as to all other infectious diseases; the patient must be kept in bed till the eruption has disappeared, and longer still if there is any tendency to lung disease, as is so often the case, which is shown by a continuous high temperature and the state of the breathing. The diet should be light in this and all other eruptive diseases, very nourishing, and with but little animal broth or tea in it, as this is apt to be overstimulating, except in cases of great prostration, when animal broths are prescribed.

Every mother who raises a family of children should learn of physician or druggist how to use a fever thermometer, which will be of great assistance to her in ascertaining a child's temperature. With this knowledge she will never be too late in calling in assistance to save an illness of long duration, and in many cases the life of a child. Pneumonia and measles often occur together. In the case of measles the fever begins to fall about the third day; but if it persists high or rises above 103 degrees Fahrenheit, then the mother or nurse must be on the alert for some complications, and must look out for all symptoms that may aid the doctor in detecting the mischief, and she must keep the patient warm and lying down, while she pays attention to the evacuations, and supports the strength with careful systematic feeding. Always notify the doctor if there is a sudden rise of temperature, shortness of breath, and coughing, etc., complicating measles, as you are likely to have a case of pneumonia to deal with.

One great essential in nursing is, scrupulous cleanliness, in all cases of illness, in the person of the patient and in all its surroundings. A sick child should be washed all over every day and sometimes twice a day; every part of its body should be examined, that the first sign of a sore may be detected, or any change in its condition, such as swelling, discoloration, or enlargement about the joints, and such information should be handed over to the attending physician at the earliest opportunity. In the case of young babies, their skin requires washing and drying each time the napkin is changed; a nurse who knows her work, and all mothers, should be able to keep a child clean and its wants anticipated without giving in to lazy ways. If the patient is to be kept clean, the bed must be kept clean likewise, and all soiled linen must be at once taken out of the house, not pushed under the bed out of sight, as is often the case, nor one wet end of the sheet tucked under the mattress, but must *absolutely* be put in its proper receptacle, where it will do no harm. Every mother should have a few draw-sheets put by for use in case of sickness. The hospital draw-sheet is very necessary for a sick-bed; it can be quickly drawn away without much disturbance to the patient and quickly substituted for another. A draw-sheet is a long, narrow sheet, about one and one-half yards long by three-fourths of a yard wide, of a coarser material than linen, and is placed under the body of the patient, sometimes with a square of rubber under it; it is then well tucked under the sides of the mattress, and pinned down, and serves also to keep things straight.

Feeding.—The importance of feeding can not be exaggerated; it is a subject of growing interest the world over. Nine-tenths of the ailments of children are said to be due to some error in the feeding; and it is generally conceded that many lives are lost in cases of sickness which might have been saved if only the nurse had understood something of the art of feeding the sick. And it is art; indeed, it should be placed above every other art in this twentieth century.

Delicately-prepared and properly-seasoned food will invariably quiet the child, and it is the same with adults. An angry father has been known to make peace with his wife after he had partaken of food daintily prepared by her own hands. The preparing of food for a sick child is no ordinary matter; it is a complex problem. There are, in the first place, varying ideas as to the quantity that a child should consume, and as to the frequency with which such food should be given, also as to its component parts. Nature's standard has been given as to what is the proper food and the proper quantity for the infant, and from this she intends us to work out the problem. In the constitutionally weak child, that has to be brought up by means of a feeding bottle, it is very difficult; the child's diet must be carefully studied, and then that food which seems best suited to it must be adhered to. In dealing with these difficult cases, common sense must be used; all theory must be set aside, and that food used which agrees the best with the child. It will be found that in the case of weak children, five drops of brandy to each feeding for twenty-four hours or so, will often give the tone and vitality to the stomach which it has lost through weakening diarrhea and vomiting.

In feeding, system is most essential. Let us suppose that a child has to take one and a half or two pints of food in twenty-four hours; then let this be divided into equal quantities, to be given at equal intervals of time. Suppose the diet consists of one pint of milk and one pint of beef tea, with some stimulant, then it will be found that an alternate feeding of two ounces every hour will use up the quantity in the time. This mode of feeding, it will be seen, naturally applies in its frequency to serious illness, where the strength requires such sustenance; but where the child's condition permits, the stomach is allowed to rest at night with the body. Night feeding is not as essential as the day; a little nourishment given early in the morning, when vitality is low, is of great value. Rational and systematic feeding in typhoid fever is about all the treatment; not much else is required, but good food adapted to such cases and good nursing, with antiseptic precautions and cleanliness. As long as the high temperature keeps up—and that usually runs three weeks or sometimes four—the patient is kept strictly on a mild and liquid diet, such as milk (buttermilk or koumiss for adults) and beef tea with no admixture of bread or starchy foods. All outside interference from relatives, who often mean well in suggesting various articles of food, must be sternly set aside. A useful mode of feeding when a child is refractory, or when from any other cause it can not take its food, is through its nose. Skilled hands only can administer food in this manner, as in unskilled hands it may be fatal.

Bathing.—Most children like their bath, although some dread it; fear of the bath is sometimes caused by roughness in washing the child, or by hurrying it too suddenly into a bath. A child can be taught to enjoy a body bath from birth by proper and careful handling

from the first. Never have the water too hot or too cold—just a little more than blood heat. Rickety children are very tender to the touch, and require gentle manipulation when in the bath.

The bath is essential for both sick and well; hence the mother and nurse must use special gentleness in giving the bath so that a child may overcome its fear. The temperature of the bath should be about 98 degrees Fahrenheit. It can be tested by the use of the thermometer, or it may be just comfortable to the back of the hand (must not be what you call hot). When the bath is over, have at hand a warm blanket or Turkish sheet, either of which is desirable, on which to place the child while being dried; this must be done quickly, with a warm, soft towel, and warmed garments put on quickly, and the child placed back in the bed. Remember to have a fresh, clean bed made for the child while the bath is being given. If a douche bath is ordered, and the regular appliances are not handy, place the child in an ordinary warm bath, standing, if possible, and then pour a jug of cool (not cold) water down the spine from a height ordered by the doctor, onto that particular part for which the douche is ordered. Rub the part well with a rough towel, so as to get up a good circulation, and knead it with the hands. If a bath is ordered to reduce the temperature, its temperature should be 65 degrees Fahrenheit. The bath must be brought to the bedside, the patient lowered into the bath on a blanket, and kept in for five or ten minutes, according to the doctor's orders, then removed from the bath, dried quickly, and put back into bed.

The morning and evening warm bath for young children should be a part of the daily program, and in babies it is most essential that the pores of the tender skin should be kept freely open and healthy. A soft piece of linen may be used for washing, or a very fine soft sponge, and then the body carefully but tenderly dried; pure castile soap is the best for washing infants. For older children the bath may be made tepid until they are strong enough to take a cold bath. In administering the cold bath, keep the feet out of cold water, then give a dash of cold water all over the body (after the body has been washed with warm or tepid water) with a large sponge, and dry the body quickly. If the surface is blue, the reaction is imperfect, and in such cases the tepid bath only must be used, as the shock of the cold water is too great for the system. No child under seven years of age should take a cold bath. It is very essential in all bathing that the skin and hair be dried thoroughly and quickly. A nervous child may be given something to play with while bathing, to distract its mind from the bath.

The clothing of the sick child should be loose, light, and easily changed. A sick child needs some warm jackets to put on during the daytime while confined in bed, as it does not keep covered, like the adult, and its shoulders and chest need protection. All bedclothing must be light and warm, not doubled in a heavy fold over the chest, as is so often the case.

When a child is convalescing, it is necessary that the surface of the body be thoroughly well covered with light, warm clothing, made loose; woolen clothing is more suitable than cotton, and is lighter. Never put a stiff garment next the child's body; all binders of all kinds are a mistake; they interfere with the free use of the muscles. In sickness the flannel vest and the bedgown require frequent changing. All sick children should have a gown put on fresh for the night; it gives rest to the patient. In surgical cases the bedgown should be open down the whole length; the same applies in adult cases as in typhoid fever.

In arranging bedclothes where a child needs to have a bed-pan placed under it, a circular bed-pan put under a circular air-cushion, and the sheets arranged accordingly, will keep the child quite dry, as in case of operation for a stone in the bladder. A hair mattress put onto a box mattress is the best bed for all patients. The springs should be stiff, and must not sink down about the hips, as such a bed is very wearing on the patient. A board placed over a hair mattress with a hair mattress over the board makes the best bed for children who have a rickety spine, and is best for all growing children. Put two sheets on the bed, folded straight down the center, so that they can be easily withdrawn, and kept in place with a draw-sheet, and then the rest of the clothing is arranged so as to give the most warmth. Do not allow any creases to get under the hips or shoulders of the child, and thus avoid bed-sores. The pillow should be changed daily and aired often. If small pillows are required to support a limb, these should be firm, like sand pillows, and as small as possible. Every appliance must be made and adjusted so as to suit all cases. It takes constant care, great patience, and minute attention to nurse a sick patient, either child or adult, back to health, but it can be accomplished. Nothing is too small which contributes to such an object, and success will attend upon careful thought for all these details. The mother is amply repaid when she sees her child returning to health again, bringing joy and sunshine to the home.

CHAPTER XLVIII.

DIARRHEA.

SIMPLE DIARRHEA.

Etiology.—Predisposition is the same for this as for all other varieties of diarrhea,—age, under two years, bad intestinal hygiene, such as bad habits of breathing, improper food, unsanitary surroundings, and the warm season.

The most important special causes of this variety are those acting upon the nervous system. As such may be classed dentition, chilling of the surface, exhaustion from fatigue or other causes, and the first effects of atmospheric heat. Exhaustion and heat are very much more frequently associated with dyspeptic diarrhea, but not always. The same may be said of menstruation and various nervous impressions upon the mother of a nursing infant. As we know, a nervous mother does not always produce healthy milk for her infant.

Foreign bodies, or articles of food which are virtually foreign bodies—such as uncooked or partly cooked grains of rice, hominy, barley, or green corn, or green fruits, nuts, or raisins in the case of very small children—any of these may be the cause of simple diarrhea. Certain fruits, such as peaches, pears, grapes, etc., make slight diarrhea, from the organic acids they contain, or from their seeds acting mechanically.

Diarrhea may be due to any one of the various cathartic drugs, in which the normal physiologeal effects have, from the susceptibility of the patient, been very greatly exaggerated in intensity or prolonged. A hyper-secretion of bile is generally believed to be a cause of diarrhea. Such causes are thought to be rare. Ice-water is thought to cause an attack of diarrhea, apart from any other visible cause.

Pathology.—In these cases we have neither intestinal decomposition nor intestinal inflammation as the cause of the symptom. There is increased action of the bowels, of reflex origin, or depending upon local irritation, increased secretion, chiefly serous, and in most cases a moderate hyperæmia. If the exciting cause continues operative, the case may go on to intestinal inflammation.

Symptoms.—These may come on suddenly or gradually. If suddenly, there is usually abdominal pain preceding the diarrhea; otherwise this is absent. There are at first one or two soft, fæcal stools; then they come quite thin, and may be watery. There may be as many as eight or ten in a day. There may be restlessness in case of infants,

and at all times there is a great deal of exhaustion, and often a clammy skin from perspiration. But there is no vomiting, and the temperature is not elevated; these two negative symptoms quiet at once the apprehensions that may have been felt regarding a more serious illness. The stools are not often green in an infant, but are a pale yellow or gray color; in older children they are thin and brown or gray, and in all there is more or less odor. If the cause has been some material acting as a foreign body, this may be found in the discharges. If left to themselves, these cases usually recover in three or four days; but they may develop into more serious forms of intestinal disease, particularly if it is in summer. If the cause is not removed, there may be frequently-recurring attacks, such as have been described, until a chronic diarrhea is finally established.

Treatment.—The cases are usually and promptly cured if taken in time. Opium is the sovereign remedy; but before this is given a full dose of castor-oil should be administered. A teaspoonful may be given to an infant of from three to six months, a tablespoonful to a child over four years old. If the cause of the diarrhea is any mechanical irritation, this preliminary cathartic is an absolute necessity. It is a good rule in all cases. Calomel one-tenth to one-twentieth of a grain, or syrup of rhubarb (℥j to ℥jss) may be substituted for the oil; but they are less certain and less satisfactory. Five or six hours after the cathartic, the opium should be given. It is a good rule to prescribe a safe dose, and order it repeated after each stool. Paregoric and Dover's powders are probably as good as any, or subnitrate of bismuth and paregoric. For a child a year old, from six to ten drops of paregoric is a dose, or a quarter of a grain of Dover's powders may be ordered in the manner indicated. Opium stops peristalsis; and after the intestines have been emptied, that is mainly what is wanted in these cases.

In cases not yielding promptly to opium, bismuth subnitrate may be added. Keep the child quiet in the crib, and on no account must it be allowed to run about till it is quite well. The diet must be boiled milk thickened with a little flour. Not much food should be given for from twelve to twenty hours, and then for three or four days only very easily-digested food which can almost entirely be absorbed. The intestines must be kept quiet until all irritation has subsided. Barley-water, thin broth, and whey may be used; in many instances use no milk except breast milk. Careful feeding must be kept up for a week to prevent a recurrence of the diarrhea. If it is summer-time, this is imperative. A proper management of these cases of simple diarrhea is one of the most important prophylactic measures against severe forms of intestinal disease. On no account should these cases be neglected because the child happens to be teething.

CHOLERA INFANTUM, OR ACUTE DIARRHEA OF BACTERIAL ORIGIN.

Synonyms.—Acute gastro-intestinal catarrh, cholera infantum, summer complaint, summer diarrhea, infectious diarrhea.

ACUTE DYSPEPTIC DIARRHEA.

Etiology.—Acute dyspeptic diarrhea includes a greater number of cases of summer diarrhea, or at least forms a stage in these cases. It is said that it is most frequently the initial stage, but is sometimes the final one. The causes are summer heat, artificial feeding, bad habits of feeding, improper food, impure milk, bad surroundings, and city residence; all these are etiological factors.

Pathology.—Dyspeptic diarrhea is a diarrhea set up by undigested foods in the intestines, and by the putrefactive changes in such food. If the resistance of the patient is great, the cause a transient one, and the case properly managed, there is only functional disorder, and there may be complete recovery in a few days. In a susceptible patient, where the exciting cause continues operative, or when improperly managed, the process continues, and anatomical changes are produced; the case then becomes one of gastro-entero-colitis, in which the dyspeptic diarrhea was the initial stage.

Synonyms.—Acute gastro-intestinal catarrh, cholera infantum, gradual onset, with little or no fever, usually without any gastric disturbances; secondly, a severe form, in which the onset is sudden, usually attended by high temperature and by vomiting. In the mild form there may be for the first few days no symptoms except the diarrheal discharges, or the child may be peevish, fretful, especially so at night, and may seem generally out of sorts. From the fact that the general symptoms are so few, mothers often allow cases of this kind to go on for several days under the common belief that the children are "only teething."

The stools are green or yellow, thinner than normal, and containing masses of undigested fat and occasionally curds. Sometimes they are of an offensive odor, but frequently not; there are usually from three to six passages daily. After a few days they contain in most cases mucus in smaller or larger quantities. Fruits or starch foods appear in the stools almost unchanged. The appetite may be normal, but is usually impaired, and may be almost lost after a few days. The tongue shows generally a thin white coating; the mucous membrane of the mouth may be congested, or in very young infants covered with thrush. Sometimes the general health will not be noticeably affected for two or three weeks. Often after a few days the infant becomes pale and spiritless; it loses flesh, and its limbs become soft and flabby. If proper treatment is instituted, and the cause is removed, there is noticed an improvement in the character and frequency of the stools; the mucus disappears; the color becomes a pale yellowish green and finally yellow; the appetite returns; the strength and spirits improve;

and the child recovers after an illness of from four to fourteen days. Relapses are very easily brought on by slight irregularities in diet, especially overfeeding. In the cases which do not run a favorable course, the disease may become either cholera infantum or enterocolitis. This change often takes place with great suddenness, and is frequently coincident with a few days of hot weather or follows some gross dietetic error.

A third termination, but not as common as either of the preceding, is a continuance of the mild symptoms, with exacerbations and remissions, during the entire summer season, until the cold weather of autumn comes.

The cases may be cut off at any time by any incurrent disease, especially pneumonia. In the cases developing suddenly, the case is quite a different one. The attack may begin abruptly in a child apparently healthy, or there may have been for some days symptoms of slight intestinal derangement. If an infant, it is restless, cries much, sleeps but a few minutes at a time, and seems in distress. The skin is hot and dry, the temperature runs up rapidly to 102° or 103° Fahrenheit, often to 105° Fahrenheit; the abdomen is distended, and is hard; the legs are usually drawn up, and all the symptoms indicate the onset of some grave disorder. The nervous symptoms in some cases are very severe, and even convulsions may occur. There may be great thirst so that everything offered is taken eagerly, or on the other hand everything may be refused.

Usually in the course of from four to six hours after the onset the gastro-intestinal symptoms come on. There is first vomiting, which may be of undigested food taken many hours before. If this was milk, it frequently comes up in hard curds and very sour. After the stomach has been apparently emptied, mucus and serum are ejected in small quantities after much retching and straining, and sometimes the vomiting is bilious. The vomiting is easily excited by the giving of food or drink. Diarrhea soon follows,—first, feculent stools, then great bursts of flatus, with the expulsion of very thin yellowish stools of a terribly offensive odor. Four or five such discharges may occur in as many hours. In other cases the stools are gray or greenish yellow, sometimes brown. But the characteristic features are the amount of gas expelled, the colicky pains preceding the discharges, and the sickening odor.

In a larger number of the cases this free evacuation of the bowels is followed by a fall of temperature and subsidence of the nervous symptoms, and the child falls asleep, to be awakened for an occasional stool after a few hours.

The prostration is often great in the beginning, but not of long duration. Under favorable circumstances and with proper management, the case, after twenty-four or thirty-six hours of severe symptoms, may go on to a rapid convalescence. The movements continue

abnormally frequent for three or four days, but gradually assume their normal character, and a prompt recovery can usually be expected.

The chief features contributing to such favorable results are a good constitution on the part of the child, and the ability to regulate the feeding afterwards.

If circumstances are not so favorable, if the child is cachetic and badly cared for, the fall in the temperature is often only a temporary one. The vomiting may not recur, but the diarrhea keeps up; the stools, gradually changing in character, become less offensive perhaps, and not so fluid, but they contain mucus, and are occasionally streaked with blood. In other words, they become more and more of the character seen in enterocolitis.

The general symptoms follow the same course; the first profound impression made upon the nervous system subsides, and the child becomes pale, worn, prostrated.

It may not be until the third or fourth attack that the enterocolitis is finally established. In children over two years old there are some features which differ from the cases described above as occurring in infants.

Here the attack usually follows the ingestion of some indigestible food, such as green apples, unripe berries, etc., or milk which has been tainted from exposure. Vomiting does not come on so readily as in infants, pain is a much more prominent feature, and, as a rule, the temperature is lower.

Such cases, although beginning with severe symptoms, usually make good recoveries; there is much less likelihood of their running on to inflammatory forms of diarrheal disease than in the case of infants.

Diagnosis.—The diagnostic points about the acute attacks are their sudden onset, their severe symptoms, their brief duration, and usually their favorable termination. They are violent, often alarming, but a brief convalescence is established in two or three days.

Dyspeptic diarrhea is to be differentiated from cholera infantum and gastro-enteritis or enterocolitis, and in its onset from the general diseases, malaria, scarlatina, pneumonia, and tonsillitis.

From cholera infantum it is distinguished by its milder character,—the prostration being less, the temperature usually lower, the nervous symptoms less pronounced,—but particularly by the stools. The large serous neutral or alkaline stools belong only to cholera infantum. Although nearly every case of cholera infantum is preceded by a dyspeptic diarrhea of greater or less severity, the former is not to be regarded as simply a more severe form of acute dyspeptic diarrhea.

To differentiate the cases from those of inflammatory diarrhea is impossible for a day or two. The onset is often exactly the same, and we can not say at once whether they are going on to the development

of inflammatory changes or not. The subsidence of fever and all severe symptoms at the end of twenty-four hours or thirty-six hours shows that we have had only a putrefactive process with functional derangements, while a continuance of severe symptoms, and especially of the fever, beyond the second day, is usually evidence of inflammatory changes.

The sudden development of high fever, prostration, vomiting, and even diarrhea, is common to very many diseases of infancy, especially to malaria, pneumonia, scarlatina, and tonsillitis. The symptoms of the latter are often so severe that it is not to be believed that the sole cause is a gastro-intestinal disorder.

Tonsillitis is revealed by an inspection of the throat, and in scarlatina we must wait until the time for the rash. The question of malaria is a difficult one to decide, and may require an observation of the temperature for two or three days.

Prognosis.—There are a very few cases of acute dyspeptic diarrhea that prove fatal except among children already suffering from *athrepsia.* It is not uncommon among such children in institutions to have fatal cases of diarrhea which have never presented any choleraic symptoms, and which do not show at autopsy the lesions of enterocolitis. (W. Pepper, M. D., LL. D.) The feeble constitution is overcome in the first stages of intoxication and prostration. It is a surprise to see with how few symptoms such children succumb.

Treatment of Dyspeptic Diarrhea.—Could proper prophylactic rules be carried out, these diseases would cease to be what they are now,—the greatest scourge of infancy.

Prophylaxis means the hygienic surroundings of children and all sanitary conditions in the cities, cleaner streets, more open parks, and better sewerage. While these are not strictly filth diseases, yet filth certainly conduces to their development. In the tenement homes and institutions for infants there should be more air and sunlight, and less crowding, and about the country villages and in country homes greater cleanliness. Where there is no drainage only into cesspools, plenty of lime should be used daily during the summer especially; put lime about the dooryard where is thrown the waste water, etc. Keep the swill receptacle cleaned out. In country places we see swill sometimes accumulated in barrels and allowed to stand and ferment, sending off its poisonous germs, which, if inhaled by many persons or infants, will breed sickness. Frequent bathing and proper care of diapers will prevent sickness; the proper disinfecting of the stools where they are passed into a vessel by older children is as essential as it is in typhoid fever. (See Typhoid Fever.)

Do not keep the young infant too warm; seek as cool a place as possible during the summer months.

Feeding.—No weaning should be done, if it can be avoided, during summer.

Too Frequent Feeding.—No more pernicious habit exists, and none more certain to set up gastro-intestinal disorders, than that of fill-

ing a large bottle with food, and putting the nipple into the child's mouth while lying in the crib, allowing it to sleep and eat alternately for the greater part of the time. The same can be said of the habit of allowing an infant to sleep at the mother's breast, and nurse every time it awakens during the night.

Improper Food.—The habitual use of improper articles of food is a very important predisposing cause of diarrheal disease. Children thus fed suffer almost always from a mild intestinal catarrh. No infants' food can compare with cow's milk for infants during the first year of life. The extensive use of all dextrine and starchy foods as substitutes during this period is to be deprecated, also during the second year of life the use of most vegetables, particularly beets, tomatoes, and potatoes, fruits especially in cities, and in the summer, all dried fruits, all cakes and sweets, coffee and tea. In older children improper food is the exciting cause in many cases.

The care of bottles and rubber nipples is second in importance only to that of the milk itself.

To Clean the Bottle.—Rinse with cold water, carefully scrub with brush and hot soap-suds, fill with weak soda solution, and let stand till needed for milk supply; then boil for half an hour, or bake for half an hour in a hot oven, and fill with cotton.

Never use long rubber tubes for feeding. Only rubber nipples, which slip over the mouth of the bottles, should be used. These should be turned inside out and scrubbed at least once a day, and at all times when not in use should be kept in a solution of borax or salicylate of sodium.

Another important point in the prophylaxis of severe forms of disease is early and prompt attention to all the milder derangements of the stomach and intestines, particularly during the summer. The larger proportion of cases of cholera infantum and enterocolitis are preceded for some time by milder symptoms. Prompt attention at the onset is usually effectual. Too much can not be said in condemnation of the practise of allowing a slight looseness of the bowels to go on for a week or two simply because the child happens to be teething. Such an error has cost many an infant's life.

Every gastro-intestinal derangement, no matter how slight, should receive prompt attention with the idea that at any time severe and even dangerous symptoms may supervene. Carefully sterilize the milk, observe scrupulous cleanliness in bottle and nipple, and give prompt attention to all mild derangements, especially in summer. Cut down the amount of food, and increase the amount of water during the days of excessive summer heat. Hygienic treatment—a change of air from the city to the seaside or to the mountains if the proper food can be obtained—is beneficial, or go to some place you will be likely to have the best food. In the country or in small towns a change is not so necessary, and in fact is not generally required unless the conditions become somewhat chronic. In such cases a change of air does more

good than all other means. Fresh air is of the utmost importance in all diarrheal cases in summer. Children should not be allowed to walk, even if they are old enough and strong enough to do so; they can be kept out in carriages or hammocks. Quiet is also very important.

Clothing in summer should be the lightest flannel to be obtained; a single loose garment is preferable. A thin layer of muslin can be put next the skin where there is much perspiration.

Bathing.—Bathing is of very great advantage, to allay restlessness, as well as for cleanliness and the reduction of temperature. For the first purpose a sponge bath of alcohol and water or vinegar and water is sufficient; for reduction of temperature only the tub-bath is to be relied upon. If the temperature continues above 102° Fahrenheit, or near that point, systematic bathing must be carried on. The temperature of the bath should be nearly 100° Fahrenheit when the child is put into it, and should then be gradually reduced to 80° or 85° by adding ice or cold water. The bath should be continued for from ten to thirty minutes, according to the amount of reduction effected, and repeated from two to eight times daily, according to the requirements of the case.

The bath thus used has generally a very quieting effect, which would be entirely lost by the terror and excitement caused by putting an infant suddenly into a cold bath. Napkins should be removed from the child immediately after being soiled, and put into an antiseptic solution; never leave a soiled napkin in the sick-room. Frequent washing of the buttocks and genitals, together with the irritation from the discharges, often causes excoriations; if these exist, use bran-water for bathing instead of plain water.

Dietetic Treatment.—Dietetic and hygienic treatment in this class of diarrhea is very much more important than the use of drugs; it is important to remember that during the acute stage of the febrile symptoms digestion is practically arrested. To give food requiring much digestion can do only harm in the stomach; it produces irritation until it is expelled by vomiting, or passes into the intestines, adding to the fermenting masses there present and aggravating the existing disorder. In nursing infants the breast must be withheld as long as a disposition to vomit continues, and no food whatever given for six or eight or twelve hours. Thirst may be allayed by rice, barley, or toast water, or mineral water given cold and frequently but in minute quantities; stimulants may be added to these if they are refused or vomited. Absolute rest of the stomach will do more than all else to hasten recovery. After the stomach has been quiet for ten or twelve hours, it is safe to allow the child to be put to the breast tentatively. The intervals of nursing should not be shorter than three hours, and the amount allowed at one feeding should not be more than one-half or one-third the usual meal. The remainder may be made up by mutton or chicken broth or by thin barley gruel. The amount may be steadily increased, so that in three or four days the breast may be taken exclusively. If there is any reason to suspect the cause of the attack

to be menstruation, pregnancy, or some nervous influence, as exhaustion, grief, or fright on the part of the nurse, the nursing from the breast must be stopped temporarily or permanently, according to circumstances, and a wet-nurse secured, or begin hand feeding.

In young infants who are being hand-fed, if the attack is a severe one in summer, a wet-nurse should be secured wherever this is possible. In cases where a wet-nurse is out of the question, we are brought face to face with one of the most difficult problems in the management of diarrhea; but until the exact nature of these dyspeptic diarrheas is better understood, we must be guided by experience alone.

First, as to the use of cow's milk while nursing: Infants should generally be put back to the breast as soon as vomiting is permanently controlled, but it will not do to follow this rule in respect to cow's milk; this must generally be withheld in all forms until acute symptoms are past. The experience of the profession is nearly unanimous upon this point. (W. Pepper, M. D., LL. D.) Our reliance at this stage is upon egg water;[1] animal broths,[2]—chicken, mutton, or beef; the expressed juice of beefsteak or beef peptonoids;[3] barley and rice water, and dextrine foods, such as Liebig or Horlick's malted milk, or Mellin's Food made without milk; flour-ball[4] and water, or wine whey.[5]

After the first two or three days, when the symptoms of acute fermentation have subsided and the stools are less frequent, we may add cow's milk to the diet tentatively. It is not enough that milk be sterilized, for this procedure, although of great value as a prophylactic measure, has but little curative value.

There are three methods of administering milk. The first is by free dilution,—at least four parts of plain water or barley water to one of milk. In many cases this will agree perfectly, and nothing more will be required; and as the case progresses, the proportion of milk can gradually be increased. The second is partial peptonization by the use of Fairchild's tubes. Directions for the preparation of the milk come wrapped around the tubes; the process is to be continued from six

[1] *Egg Water.*—Beat a little; to the white of one fresh egg add a teaspoonful of brandy and one pint of cold water, previously boiled.

[2] *Animal Broth.*—One pound of finely-chopped lean meat (chicken, mutton, or beef), one pint of cold water (one and one-half pints for young infant); put in a glass jar and let it stand from four to six hours on ice (or if in the country where no ice is to be had, put the jar into cold water), and keep covered. Cook three hours in a closed jar over a slow fire; strain, cool, skim off fat if any arises, season with salt, and feed warm or cold. It may be cleared with the white of an egg if desired.

[3] *Beef Juice.*—Thick steak, broiled rare, juice pressed out with squeezer, and seasoned. Of the beef peptonoids, Carnrick's liquid preparation is said to be best borne.

[4] *Flour-ball.*—Tie two or three pounds of wheat flour in a bag and boil continuously for twelve hours; scrape off the outer shell, and grate the inner yellow portion (mainly dextrine) to make a thin gruel.

[5] *Wine Whey.*—A teaspoonful of wine of pepsin; one pint of milk at a temperature of 110° to 120° Fahrenheit; let stand until firmly coagulated; break up curd and strain. Add sherry wine in proportion of one to four or one to six. Feed when cold.

to fifteen minutes, and not allowed to go so far as to develop the bitter taste. The third method is the same process continued for two hours, at the end of which time all the caseine has been digested. Lemon juice can now be added to cover up the bitter taste without causing any curd. With the addition of a little sugar, a very palatable food is thus produced; and it is readily taken, all the more so because of the sour taste.

Fermented milk, as koumiss, serves a very useful purpose, and can often be retained upon an irritable stomach when almost everything else is vomited. At first young infants will take it, but soon refuse it.

General Rules Regarding Feeding.—No food whatever is to be given upon a very irritable stomach. Articles requiring the least digestion and leaving the smallest residue should next be tried. Food should be prescribed with the same exactness as for drugs. Quantity and frequency must be definitely stated, as well as the kind of food ordered. Directions should be made in writing, or they will be forgotten before the physician is out of the house. A practical acquaintance with the proper appearance and taste of every food ordered is very necessary.

There are four common mistakes in feeding in diarrhea, which are the cause of many failures,—feeding too much at a time, feeding too frequently, trying too many articles at once, and changing food before a thing has been really tested.

For a single feeding the quantity allowed will vary according to the tolerance of the stomach; but it should be always much less than is given in health, usually from one-fourth to one-half the amount, until the child demonstrates his capacity to digest more. It is rarely necessary to nurse or feed a sick child oftener than every two hours. Of course in cases of great prostration stimulants may be required much more frequently. We have only to imagine how an adult with a sick stomach would feel to be offered something in the shape of food every five or ten minutes, in order to appreciate the disgust for all food which soon overtakes an infant who is similarly besieged.

It is a difficult problem to feed these children under three years of age, capricious as they are by nature, and still more so by education; and the judgment and tact of the physician are taxed to their utmost. We must have many resources; for a diet which one child takes well, the next child disdains utterly. The best method is to select from a list of articles of accepted value (which has been mentioned in this article), such as circumstances will permit, and such as are most easily prepared properly, and try them patiently, one after another, until one is found which the child under treatment will take, and which agrees with it.

Medical Treatment.—In these cases it must be borne in mind that we are not treating the intestinal inflammation, although such may be the ultimate result of the process beginning as a dyspeptic diarrhea. Essentially here our treatment is to be directed against the process of

fermentation or putrefaction, and toward the restoration of the normal gastro-intestinal functions, which have been deranged.

The indications are, first, to evacuate the fermenting masses from the stomach and intestines; second, to combat the process of decomposition by drugs and proper food; third, to restore healthy action by intestinal hygiene; fourth, to treat symptoms and complications.

Emetics, although they may serve a very useful purpose in older children, are not to be advised in young infants.

In such cases the most certain measures are to wash out the stomach, but this is to be done only in cases where there is uncontrollable vomiting. The largest-size flexible rubber catheter is the best instrument, and plain lukewarm water is considered best. The water is allowed to flow in and out freely until it comes away quite clear.

Stomach washing may be practised without danger by the physician in the case of youngest infants. It is a simple procedure; in fact, it is easy to pass the tube into the œsophagus, as any one familiar with intubation will appreciate. A simple washing-out of the stomach in most cases is all that is required. It is never necessary to repeat it more than once daily. After the stomach has been emptied, a small quantity of some medicinal solution may be left in the organ if desired. In Germany the solution most employed is said to be a three per cent solution of benzoate of sodium. The author has found subnitrate of bismuth to be very useful in dyspepsia of bacterial origin in adults, after washing out the stomach. Usually ten grains are administered. In adult cases the author has had very satisfactory results by the use of the galvanic current, applied through the stomach tube direct to the mucous membrane of the stomach, water having been passed into the stomach previously, for the purpose of conducting the current evenly over the mucous membrane, etc. (See article on Electricity.) It will destroy the bacteria in the stomach.

Returning now to the infant; as a substitute for stomach washing, some authors have advocated the practise of allowing infants to drink freely of fluids, especially ice-water, which is generally taken readily, although almost immediately vomited. But it is unsatisfactory in its results, and certainly acts as an irritant to the stomach. Washing out the stomach is undoubtedly the best practise.

To empty the intestines is necessary in every instance, no matter whether or not any indigestible food has been taken. This may be accomplished by cathartics or by intestinal irrigation. Of the cathartics, castor-oil and calomel are greatly superior to all others. Calomel has the advantage of ease of administration, its favorable effect upon vomiting, and its anti-fermentative effect, as well as its purgative action. One-tenth or sometimes one-fourth of a grain of the tablet triturates given dry upon the tongue is sufficient; for a child under two years give every two hours till three doses are administered. If the stomach is not upset, castor-oil is all that is needed to sweep out the whole intestinal canal, carrying away all its pent-up, fermenting mass; it

causes little griping, but you may add a few drops of paregoric or not, according to circumstances, and the after effects are constipating. But if there is vomiting, first give the calomel, and follow, if need be, with a small dose of castor-oil in about twelve hours. A child a year old may take two teaspoonfuls of castor-oil with a few drops of clear brandy or in an emulsion, taken warm always. It is important that a full dose be given, the initial cathartic dose of castor-oil. Almost complete abstinence for twenty-four hours, and very careful feeding after that time, suffice to cure a very considerable proportion of these cases. Only cathartics can be employed to evacuate the small intestines, while for the colon we may use enemas by irrigation of the intestines. This has now been so long practised, both in this country and in Germany, that its value is well established. To be effectual, the water must reach the ileo-cæcal valve; it can not be expected to do more. Attention to detail is necessary for success. The infant is placed upon the back, with hips elevated on a small pillow, and the water introduced through the largest size of a flexible rubber catheter or a rubber rectal tube of the same size, which is passed into the colon—if possible, beyond the sigmoid flexure, as in that case the intestines above are easily filled. At least eight inches should be introduced. The catheter is attached to the nozzle of a fountain syringe, the bag of which is held three or four feet above the patient. During the introduction the water should be allowed to flow; and as the intestines become distended a little in advance of the catheter, this greatly facilitates the process. The passage of the water into the bowel high up is also aided by abdominal manipulation. To be certain that the water has reached to the cæcum, we must have at least a pint in the colon at once for a child of six months, and a quart for a child two years old. (W. Pepper, M. D., LL. D.) The author has found two-thirds of a pint of warm water for an infant six to ten months old a sufficient amount to use in irrigation of the bowels, and usually one pint is enough for a child two or three years of age. In giving these enemas it is necessary to press the buttocks firmly together while the irrigation is going on, just so as not to press the catheter too hard, as this would stop the water from passing through it. A good plan is to put a roller bandage around the catheter until as thick as a small wrist, and press on this bandage against the anus, and it will aid the bowels in retaining the enema till the required amount of water is passed high up. Should the enema be retained too long, place the child on its feet and knead the bowels gently, and the water will soon be ejected.

Irrigation need not be repeated oftener than once in twenty-four hours, never over twice; they should be made by a physician or by a well-trained nurse. The object is to flush out the intestines well, as one would wash out an abscess thoroughly. The water may return through the tube or alongside of it. It will be found that water previously boiled and cooled, with one dram of table salt added to a pint of boiled water, is less irritating; also flaxseed tea is the most soothing

enema for irrigating the bowels. The author uses the flaxseed in preference to the salt solution. If there is an abundant secretion of rather thick mucus, a solution of borax, one dram to the pint of boiled water, is very effective.

The injection of astringent solutions is not called for in acute dyspeptic diarrhea. They are referred to under enterocolitis. The temperature of fluids for injection is a matter of choice by the physician. The author uses a temperature of 70° or 80° Fahrenheit; others use cold or ice-water; still others prefer lukewarm water.

Antiseptic Drugs.—The drugs which can be relied upon to influence decomposition in the lower ileum and the colon must be insoluble, and must be capable of being administered in large doses. Naphthaline and bismuth have this reputation.

Naphthaline may be given in from two to four-grain doses hourly, either in suspension or rubbed up with sugar dry, and put upon the tongue; give it according to the age of the child. Bismuth subnitrate is a favorite remedy for most physicians; it is of great value outside the body, as we know, in restraining putrefaction.

Bismuth is easy to administer, and is an astringent as well as containing antiseptic properties. Subnitrate of bismuth is best given in suspension in mucilage with a little spirits of chloroform or a little brandy.

℞: Bismuth subnit..... gr. x
Mucil. acaciæ..... ℥j
Spt. vini gall..... ♏ iii to v
Misce.
Sig.: This is one dose. (May sweeten to taste.)

To be efficient, bismuth must be given in large doses; that is, two to three drams daily to a child one or two years old. It always blackens the stools. No remedy in these cases has held its place so firmly as has bismuth. Calomel and salol are antiseptics; calomel has been mentioned as to its antiseptic qualities aside from being a most effective cathartic. The tablet triturate is the best form in which to administer the calomel which has been referred to. A dose for an infant is from one-twelfth to one-sixth, as indicated, to be given every hour to a child a year or two years old, till the required amount is given, that is, till the passages become greenish or brownish.

Gray powder may be used in the same way in half-grain doses with similar effect.

Salol is of unquestioned value in these cases. It is best given in suspension in doses of one or two grains every two hours to an infant a year old, or to a child two years old.

Salicylate of sodium has been most satisfactory in some authors' hands. It is to be given in doses of one or two grains every two hours to a child a year old. It should always be largely diluted; it should be given with the white of an egg; then it does not have any unpleasant

effect upon the membranes of the stomach. Sweet milk is also most excellent to give it in, where the stomach can bear sterilized milk. Calcium salt is preferred by some writers.

The bichloride of mercury has been very unsatisfactory in some hands.

A careful review of this whole subject from both a theoretical and a practical standpoint brings us to the conclusion that asepsis is better than antiseptics, asepsis being taken to include thorough cleansing of the canal, and the administration of foods free from germs and so selected as to be as completely absorbed as possible, leaving but a small residue. To this must be added pure air in the sick-room.

The acids have been recommended as antiseptics on account of their well-known power to check bacterial growth. The acids most widely used have been hydrochloric and lactic acid. Sulphuric acid is a favorite remedy with some physicians, prescribed as follows:—

℞: Acidi sulphurici aromatici.....f℥ij
Ext. hæmatoxyli..... ℥iii
Syr. zingiberis.....f℥iss
Misce et adde:
Tr-opii camphoratæ.....f℥jss

Sig.: Dessert-spoonful in water, every six hours. After the bowels are checked, diminish the amount of paregoric in the prescription, and add instead the same amount of ginger.

Astringents.—Vegetable astringents are not in use for these diseases, as was the case formerly. They are considered positively harmful, as tannin, kino, catechu, etc.

Mineral Astringents.—Bismuth, the favorite one, has been sufficiently spoken of in this article.

As a general rule, in these diseases opium is contraindicated until the intestinal tract has been thoroughly cleaned out by cathartics or by irrigation. If the number of discharges is small, or they are very offensive, opium is not indicated. Opium is especially to be avoided when marked cerebral symptoms and high temperature coexist with scanty discharges. It is indicated early in the disease, as soon as the canal has been thoroughly emptied of its putrefying contents; and also in certain cases, which are quite common, where the administration of food is immediately followed by a movement of the bowels; also where, without an elevation of temperature, and often with a good appetite, undigested foods, especially fat, constantly appears in the stools, which are frequent, because the intestinal contents are hurried along so rapidly that there is not sufficient time for complete digestion and absorption.

As to the preparations, there is not much choice between paregoric and Dover's powder. It has to be prescribed in doses suited to the age, enough to control the excessive peristalsis.

But opium should not be given to the degree of locking up the bowels entirely, or of causing marked drowsiness or stupor. For an

average child of one year, give eight to fifteen drops of the deodorized tincture, or one-fifth of a grain of Dover's powder, to be repeated every one, two, or four hours, the frequency being gauged according to the effect produced. Frequent use of minute doses is the best plan.

If, following the use of opium and a consequent diminution in the number of the discharges, there is no improvement in their character, and a rise of temperature occurs, too much has been given, and the amount must be greatly reduced or the drug stopped altogether.

Digestive Ferments.—Pepsin and pancreatin are valuable additions. Predigested foods have already been spoken of. These ferments may be given in powder or scale form. The pepsin may be given immediately after feeding, and the pancreatin one hour after meals, with decided advantage. Fairchilds Brothers and Park, Davis & Co.'s preparations are the most popular.

Stimulants are given with advantage in a very considerable proportion of the cases. The general condition of the patient is the best guide as to the time for stimulation and the amount to be given. Stimulants should be given more frequently, and earlier in the disease, than they are usually prescribed. Brandy is the best preparation for general use, champagne being preferred when there is much vomiting. An infant one year old will take with advantage an ounce of brandy, properly diluted, in twenty-four hours.

General Considerations in Treatment.—First, all cases must be carefully watched and seen frequently by the physician. Second, the character of the discharges is, in most cases, a better indication than is the number, of the condition of the patient and of the effect of remedies. Nothing is simpler than to give opium enough to reduce the number of passages; but unless there is some other sign of improvement, one has probably done little good and may have done much harm. Third, every therapeutic measure must contribute to one end, viz., to the improvement of the patient's general condition. Fourth, no matter how strongly we may be convinced of the value of any drug or combination of drugs, if these continue to disturb the stomach, they are worse than useless. Fifth, the use of all drugs is of very minor importance as compared with proper diet and hygienic treatment. Sixth, great care is necessary in every case for two or three weeks after an attack, from the strong tendency of the disease to recur.

CHAPTER XLIX.

CHOLERA INFANTUM.

In comparison with the frequency of the foregoing class of cases, those of cholera infantum are rare. They are said to include not over two per cent of cases of summer diarrhea.

The term should be restricted to cases of genuine choleriform diarrhea. (See article on Cholera Infestasia.) Cholera infantum is almost never met with in children who are entirely breast-fed. It is never seen except in warm weather.

Symptoms and Diagnosis.—Cholera infantum can scarcely be mistaken for any other form of intestinal disease, if its chief symptoms are kept in mind. The constant vomiting, the profuse serous stools, the great thirst, dry tongue, high temperature, great restlessness, followed by rapidly-developing collapse, sunken fontanel, pinched, anxious face, cold extremities, weak pulse, dyspnœa, cyanosis, stupor, coma, convulsions, and death, all occurring in the course of one or two days, are unmistakable. The only things with which the disease can be confused are acute gastro-enteritis and acute dyspeptic diarrhea.

From the first it is distinguished by its shorter course, by the more intense nervous symptoms, and by the stools, which in cholera infantum are very thin, soon almost entirely watery and colorless; in inflammatory diarrhea they are green or greenish yellow, contain mucus, and are not so large nor so frequent.

In acute dyspeptic diarrhea we have, as in cholera infantum, the sudden development of quite severe symptoms, with vomiting and diarrhea, but both are less in degree. The temperature is not often so high, and it usually falls when the canal has been freely emptied. The stools contain undigested food, much gas, and are very foul; but we have the pure serous stools; the prostration and all the nervous symptoms are very much less, and the disease very rarely proves fatal.

Prognosis.—The prognosis is worse in a young infant, worse for one who has been badly fed and poorly cared for, worse when all the surroundings are unfavorable, worse when the patient has suffered from previous intestinal diseases, and worse in midsummer.

The symptoms indicating a bad prognosis are very high temperature, 106° to 108° Fahrenheit, profound nervous depression, and uncontrollable vomiting. Favorable symptoms are cessation of the vomiting, a falling temperature (but not subnormal), quiet sleep, and improvement in the pulse and cutaneous circulation. No cases should ever be despaired of.

Treatment.—In the way of prophylaxis much can be done. All the general rules of prevention laid down in this article under bacterial diarrhea apply the same to cholera infantum. (See Prophylaxis.) Special emphasis, however, is to be laid upon the early treatment of the milder intestinal derangements, since it is a rule to which the exceptions are few, that such symptoms precede for some days the occurrence of the choleriform diarrhea.

No cases of dyspeptic diarrhea are to be neglected in the summer on the score of an existing dentition. Every and all looseness of the bowels during the summer season needs careful watching; early treatment must be resorted to, with the idea that at any time a sudden development of dangerous symptoms might occur.

The same remarks apply also to convalescence after the enterocolitis. Vigilance should not be relaxed for a day until the stools are normal, so often does one see cases which have been progressing, so far as it is possible to judge, steadily towards recovery, cut off in a day by the development of cholera infantum.

The main indications to be met in cholera infantum are: First, to arrest the discharges; second, to strengthen the heart and sustain the system; third, to reduce the temperature; fourth, to allay nervous symptoms.

Nothing in my hands has proved so generally useful as the hypodermic use of morphine in combination with atropine. It must be used with great caution, as it is capable of doing much harm.

The special symptoms indicating opium are very abundant vomiting and purging, nervous excitement, restlessness, delirium or convulsions, and feeble pulse. Opium is contraindicated where the purging has ceased or is slight, and where there is drowsiness, stupor, or relaxation. The effect must always be carefully watched; it is better to give small doses and repeated rather than a large initial dose. It may be repeated in an hour unless the desired effects are produced, which is the arrest of the vomiting and purging, or at least a great diminution of them, with improved heart's action, and the nervous symptoms allayed.

Here, as in shock, we find morphine our most reliable heart stimulant.

Opium given by the mouth is not to be relied on; there is too much uncertainty as to its absorption. It should be given hypodermically.

In the treatment of the high temperature, it is said that all drugs are useless. The child should be put in a tub-bath at a temperature of 100° Fahrenheit to avoid shock and fright, and the temperature of the bath gradually lowered by adding ice till 85° or 88° Fahrenheit is reached. This may be kept up for from ten to thirty minutes, according to the amount of reduction in the temperature effected. Baths to be efficient must be used every hour or every two hours, if symptoms are threatening. Iced cloths or an ice-cap should be kept applied to

the head. Ice-water injections are a valuable accessory to the treatment of baths. A rectal tube should be used, and the injection carried high up into the colon, the water being allowed to flow in and out freely.

The only things to be allowed by the mouth are champagne and brandy and ice. Out in the country ice can not always be obtained. In this case use cold well-water with a little brandy, which must be given in minute quantities every few minutes. Stimulants may have to be used hypodermically when the stomach will not retain anything.

Either brandy or ether may be used freely at short intervals. To attempt to give, by the mouth, food, or astringents, or drugs of any kind, is often worse than useless.

After vomiting has stopped, and the purging is under control, nourishment in very small quantities may be tried. For an infant breast milk should be obtained if possible. Cow's milk must be completely peptonized before giving it to the child. Whey or koumiss may be given. They will usually take it eagerly, on account of thirst; beef or chicken broth may be tried for older children. Only give a teaspoonful at a time to see if it is well borne; give in small quantities every half hour; the quantity must be cautiously increased, and the food given at longer intervals. It must be remembered that no digestion is going on during the acute stage, hence there can not be much absorption of food taken into the stomach. If the case goes favorably, the subsequent feeding must be carried out the same as prescribed under the head of dyspeptic diarrhea. After the stage of violent diarrhea and vomiting has passed, and if the hydrocephaloid symptoms are present, the case is to be managed according to its symptoms. Opium is to be avoided; stimulants by the mouth are to be used freely where they can be retained, and where not, must be given hypodermically. If there are cold extremities and subnormal temperature, hot mustard baths should be used to establish reaction, sinapisms applied freely all over the body, and hot-water bags or bottles used all about the patient. Baginsky recommends hot-water rectal injections. Camphor is sometimes a useful stimulant.

Hygienic treatment during convalescence is all-important. If the patient survives the first violent stage, he should be removed as soon as possible, either from the city to the seaside or out to the mountains. A change of air is the important thing.

A continuance of the fever and diarrhea without the extreme nervous symptoms and after the vomiting has subsided, means usually that the case has become one of enterocolitis; it is then to be managed like such cases, beginning without the choleraic symptoms.

ACUTE ENTEROCOLITIS.

The term acute enterocolitis is used here as a so-called clinical one, to embrace all forms of acute diarrheal disease with inflammatory conditions or lesions. It may occur at any time of the year, but is more common in the warm season.

Cold has long been regarded as a prominent factor, though this is regarded by some as an open question.

Symptoms.—There are three quite distinct forms met with: First, the dysenteric form, which is primary; secondly, the more common acute variety, which usually begins as an acute dyspeptic diarrhea, or follows cholera infantum; thirdly, a subacute variety, which, it is said, may follow either of the foregoing.

The Dysenteric Form.—These cases constitute but a small proportion of the class. They are more common in older infants than during the first eight months. The onset is sometimes quite abrupt, and sometimes gradual. In the abrupt cases we have often severe constitutional symptoms, the temperature rising to 104° or 105° Fahrenheit, prostration, not often vomiting, but severe nervous disturbance, frequently delirium, rarely convulsions. In case of gradual onset, which is most common, the temperature is scarcely elevated at all, and the symptoms are almost entirely those of an intestinal character. After one or two fæcal stools, the discharges consist of almost pure mucus or mucus streaked with blood, more rarely blood in clots. There is usually but little odor to these stools, but sometimes it is very marked. They are frequent, often every half hour, and proportionally small, sometimes only about a teaspoonful being found on the napkin after severe straining efforts. There are almost constant tenesmus and griping in severe cases. Prolapsus ani is a frequent complication, and sometimes a very troublesome one. As the case goes on, the passages contain more or less undigested food, and usually lose their peculiar character or have it only occasionally.

In severe cases there may be very great prostration, rapid wasting, and death, from exhaustion or from complications, in a week. More often they assume after a time the symptoms of an ordinary enterocolitis, and run a slow, indefinite course, with a tendency to frequent relapses.

The Acute Form.—Much more numerous than the foregoing are the cases of enterocolitis which follow an acute dyspeptic diarrhea or cholera infantum. When the latter, we have a cessation of the vomiting and serous discharges, with a fall in the temperature, and many of the profound nervous symptoms pass off; the stools become more consistent, of a brown, gray, or greenish color, contain large quantities of mucus and undigested food, and are more or less offensive. Some appetite returns, the symptoms of shock which characterize the cholera-infantum stage pass away, and the pulse improves; but there are continued loss of flesh, some fever, usually a temperature 101° to 102° Fahrenheit, restlessness, peevishness, etc. These symptoms may last for two or three weeks, with exacerbations and remissions.

High fever in these cases is not common; but when it occurs, it usually betokens an early fatal termination.

Complications at any time may cause a rise in temperature.

The pulse is always increased in frequency; the character of the pulse should always be noted. In bad cases it is feeble, irregular, or intermittent. The capillary circulation is poor, and the extremities are often cold, even when the rectal temperature is elevated.

Nervous Symptoms.—These are great restlessness, constant crying from thirst or pain, rolling in the crib, biting at the fingers, scratching the face, etc. The latter symptoms may be of an opposite character in an infant; there may be general relaxation, dulness, and the child may lie sometimes for hours unless disturbed.

Mouth and Tongue.—During the early stage the tongue is usually coated heavily and is moist; later, it is often dry, red, and glazed; the lips crack and bleed readily.

Vomiting.—Vomiting does not depend upon enterocolitis; it depends upon coexisting gastritis. Persistent vomiting developing in the course of enterocolitis is always a bad sign, and means often the supervening of cholera infantum, and speedy dissolution. Single attacks of vomiting are due to dietetic errors.

Stools.—The small mucous passages streaked with blood may be from fifteen to thirty daily. The larger ones usually average from four to ten daily.

Diminution in the number of discharges is not always a sign of improvement; if this is accompanied by a rising temperature and increasing nervous symptoms, it is a bad sign. The stools sometimes entirely cease for from twelve to twenty-four hours before death, due probably to paralysis of the muscular coat of the bowels. The abdomen may be hard and distended during the early stage; at other times it is natural or retracted and soft.

The appetite in most cases is impaired; and it may be completely lost.

The urine is nearly always diminished in quantity and high-colored and frequently is loaded with urates.

Subacute Cases.—After acute symptoms which have been described, have lasted for a variable time,—from two to four weeks,—and have passed away, the fever quite ceases, the stomach is quiet, food is readily taken, the nervous symptoms abate; but sometimes the diarrhea continues, there is no improvement in nutrition, and there is cachexia with extreme anæmia. The stools are not frequent in these cases, only four or five daily, but they contain a large amount of mucus and undigested food, and are often of a very bad odor. They may improve for a day or two upon a change of diet or medical treatment, but soon return to the old condition. After such symptoms have lasted five or six weeks, there is a gradual improvement in the stools and in weight, and the patient enters upon a slow convalescence, which is often interrupted by relapses, and the case becomes one of chronic diarrhea.

Acute Catarrhal Variety.—The very severe cases of this class resemble in all respects those of croupous inflammation. They are

rare, are characterized by a high temperature, which runs from 102° to 105° Fahrenheit, and blood in the stools is a frequent feature and sometimes comes in large amounts. They are rapid in their course, with intense symptoms, continuous high temperature, prostration, etc. The shorter course lasts about three days. Most cases are fatal. In the milder variety the temperature ranges from 101° to 103° Fahrenheit. The symptoms subside after a week or ten days, and are succeeded by a mild intestinal derangement for two or three weeks more. Relapses are common, and convalescence slow.

Follicular Ulceration.—If a delicate infant that from time to time has been specially prone to diarrheal attacks, especially if it has had symptoms of mild catarrh of the colon, has an attack which starts in with green mucous stools, and which continues with unabated severity for a week or ten days, with low fever, acute follicular inflammation is very certain, and ulceration is probable. If these symptoms continue for three weeks without intermission, the child all the time failing steadily in strength, the diagnosis of follicular ulcers becomes almost a certainty. If, on the contrary, after three or four days of acute symptoms there is improvement in the stools, and occasionally one quite fæcal in character, and if after a few days another such exacerbation occurs, succeeded by another remission, and so on, we may be pretty sure that no ulcers have yet formed. If follicular ulcers have formed, the patient rarely recovers.

Complications.—During the early acute stage of entero-colitis, an intense erythema frequently develops about the anus, nates, and genitals; in severe cases the thighs, loins, and legs also are involved. Thrush may develop in the mouth of an infant.

Diagnosis.—The symptoms have been sufficiently described in the foregoing; and the differential diagnosis of entero-colitis from cholera infantum and acute dyspeptic diarrhea have already been discussed under these diseases. In older children the difficulty is often a very real one. Typhoid fever is usually distinguished by its more constant fever, the enlargement of the spleen, the tympanitic distention of the abdomen, and most of all by the eruption. The fact of an epidemic prevailing is also to be considered. The dysenteric form of colitis may be confounded with intussusception, which should not be lost sight of. Yet the records of cases of intussusception show that in the beginning a very large proportion of them had been regarded as cases of dysentery. In intussusception we have a very sudden onset—often the hour can be definitely stated by the mother—there are acute pain and tenesmus, followed by bloody and mucous passages. In intussusception the amount of blood is often quite large, as much as a tablespoonful of clear blood. There is vomiting—often persistent—with very marked prostration, but no fever. The later symptoms are absolute stoppage of the bowels, abdominal tumor, tympanitis, rising temperature, collapse,

and stercoraceous vomiting, and have nothing in common with dysenteric colitis.

Prognosis.—In making a prognosis, the child's constitution, its surroundings, the ability of the parent to carry out the proper line of treatment, the duration of symptoms at the time the case comes under the treatment, the part of the summer in which the attack occurs, and the existence of complications should all be taken into consideration. The prognosis is worse in a feeble or cachectic child, or in one suffering from rickets, or with inherited tubercular tendencies. It is worse in cities among the poorer classes, and in institutions. It is worse in children who have previously been badly fed, in those who have suffered earlier in the season from diarrheal attacks, and those who have recently been weaned. In these cases there are continued elevation of temperature, vomiting, rapid wasting, and continuous severe nervous symptoms.

Treatment.—Prophylaxis involves all that has been said (which see). It includes special care, and early and prompt treatment of all the milder forms of diarrhea before the process shall have gone on to form more serious lesions.

Hygienic treatment must be carried out here as well as in all other dyspeptic diarrheas. Change of air from the city is often most imperative, the seashore being considered preferable.

Fresh, pure air, and plenty of it, is a necessity for all cases. The same directions for bathing may be followed as described under Acute Dyspeptic Diarrhea. Great care must always be taken to see that children are warmly covered at night.

Dietetic Treatment.—In the early stages, if the stomach is affected the case is to be managed as one of acute dyspeptic diarrhea. The gastric symptoms will usually have subsided at the end of two days, and we have then only the intestinal ones to deal with.

If an infant is nursing and the breast milk is healthy, it is not necessary to withdraw the infant from the breast. If it is only a few months old, and has been hand-fed from the beginning, or just weaned, its life may depend on its having a wet-nurse. If it is an impossibility to secure a wet-nurse, we should begin with barley, rice, or arrowroot water, or thin mutton or chicken broth, and come back gradually to cow's milk. The milk should be peptonized for two hours, then diluted with four or five times its bulk of gruel made from "flour-ball" (as has been described under the head of Dyspeptic Diarrhea), or barley flour, or rice. If curds or fat masses appear at once in the stools on the addition of the milk, it must be stopped and the white-of-egg mixture substituted, or some of the prepared foods, Liebig's, Horlick's, or Mellin's, may be tried without milk.

The greatest care should be taken to see that the milk is the best that can be obtained, and it must be sterilized, or at least boiled and kept on ice, never in a room nor out of the window, as the bad air

passes out of the room through the open window, and this is bad for the milk. Milk which turns the blue litmus paper quickly should not be used, although this is not a test to be relied upon.

Raw scraped beef put through a sieve and rolled into little balls with salt or sugar to season is sometimes a very valuable resource. Two or three teaspoonfuls of the meat may be given daily; but if the meat appears in the stools undigested, we must stop its use. The danger of overfeeding must be guarded against as well as that of giving too little nourishment. One's judgment must be used as to the amount required for the child, taking the age into consideration. An exact record should always be kept of just how much the child does take, and the doctor may find that a child six months of age, who ought to get in bulk from twenty-four to thirty ounces in twenty-four hours, is getting only eight or ten. Children should be fed regularly, not oftener than every two hours. It is always important that foods giving as little residue as possible be chosen, so as to leave as little as possible to cause irritation and decomposition in the lower intestines. In older children, the milk diet, or diet of milk and gruel, or wheat or barley flour, alternating with mutton broth, usually succeeds best.

Special care should be given to the diet during convalescence. Relapses from improper feeding come on very rapidly. A single peach, we see it reported, will cause a relapse, and a few raisins, a fatal one.

The general rules laid down for dyspeptic diarrhea must be used in acute enterocolitis.

Medical Treatment.—In the early stages the case is to be managed as one of acute dyspeptic diarrhea, by evacuants, antiseptics, and the judicious use of opium. It is of the first importance now that nothing should be done to disturb the stomach or the powers of digestion, which are always impaired to a greater or lesser degree. Hence overdosing must be guarded against.

From time to time we may aid the stomach by the use of pepsin, hydrochloric acid, pancreatin, and alkalies, or either lime-water or magnesia added to the food. The progress of the lesions in the bowels depends very much upon how well we can nurse feeble powers of digestion and absorption. By the above measures we hope to influence the intestines indirectly. Antiseptics are here of much less value than in cases of acute dyspeptic diarrhea. Calomel is said to do but little good, except in the acute exacerbations which come on from time to time. The salts of salicylic acid, both the sodium and calcium salts, and salol, may be given as previously directed. Bismuth subnitrate does not have much good effect, and vegetable astringents are useless. Opium is of value in these cases, but must be used with great discretion. It is particularly indicated when the stools are thin, frequent, of a not very offensive character, and when they are excited by the ingestion of food. It is to be used with great caution when the stools are small, infrequent, and very foul, and also when there are marked

nervous symptoms. It is best administered in a separate prescription and used occasionally for a specific effect. (See the use of opium in acute dyspeptic diarrhea and use it the same for acute enterocolitis.)

The old-fashioned emulsion of castor-oil is beneficial in a great many cases. The following is a good formula:—

℞: Olei ricini,
Spt. vini gall, aa..... ♏viii
Mucil. acaciæ,
Aqua dest, aa 3ss
Misce.

Sig.: One dose for a child of twelve to eighteen months; repeated every two or four hours.

In these cases, and in some others where there is much colicky pain and tenderness of the abdomen, with stools streaked with blood, much benefit is derived from thin flaxseed poultices applied to the abdomen, or from mild counter-irritation by turpentine stupes or by mustard.

Stimulants are needed in almost all cases. Even in young infants there is no valid objection. If the use of alcohol is ever justifiable in medicine, it is in these cases of intestinal inflammation, where we have extreme prostration, feeble powers of digestion and assimilation, and often a great repugnance to food of every kind. Stimulants are needed in the early stages as soon as the pulse becomes weak and the capillary circulation poor. At this time, old brandy is the best preparation for most cases. Blackberry brandy is preferred by many, and should be given well diluted. As much as thirty drops every hour can be given to an infant one year old. In severe cases this may be increased as the symptoms indicate. It should be given for the improvement in the pulse and in the strength of the patient. In cases of sudden collapse, it may be used hypodermically. Other heart stimulants are inferior to alcohol. In subacute cases, hygienic and dietetic measures must be depended upon; medicine does very little good. Opium is to be given only occasionally, as symptoms may require.

Local Treatment.—This is of very great value in these forms of diarrhea. The lesions lie chiefly in the colon, and it is usually the lower half of the colon which is most seriously involved, according to the pathological anatomy, as will be seen by reference. Hence we can see that the proper mode of administration is by the rectum, and not by the mouth.

Rectal injections are of two kinds: First, irrigation, which flushes out the entire colon as far as the ileo-cæcal valve, large quantities of fluid being used and being allowed to flow in and out freely; secondly, the use of enemata, in which a smaller amount of fluid is injected and retained for some time in the intestine, for its local effect.

The method of irrigating the colon has already been described. (See Dyspeptic Diarrhea.) Its purpose is mainly to empty the intes-

times completely of all masses they may contain. It need not be repeated more than twice daily, and usually once a day is enough. For an injecting fluid the normal saline solution—one dram of common salt to a pint of warm water—is less irritating than plain water. If there is much mucus, a borax solution of the same strength may be used. The water should flow in and out until it is quite clear, and from one to two gallons are used at one flushing. For general use a temperature of about 80° Fahrenheit is preferred. In cases of collapse, hot injections (110° to 115° Fahrenheit) have been advised, and in cases of high temperature and active inflammatory symptoms, ice-water may be used with advantage.

Enemata for local effect are generally used in quantities of from two to six ounces, according to the age of the patient. The intestines should first be emptied by an ordinary saline irrigation, except when nitrate of silver is to be used, when simple water should be employed. The injection, or clyster, is used about half an hour afterward, slowly introduced, the buttocks being firmly pressed together to prevent escape of the injection. A compress should be held against the anus by a nurse for from twenty to forty minutes, according to the nature of the enema and the effect aimed at. For use prepare as follows: First, bismuth subnitrate suspended in mucilage (mucil-acacia), a half dram of bismuth to one ounce of mucilage, from four to six ounces being injected, and retained as long as possible.

Second, tannic acid dissolved in water, twenty grains to one ounce of mucilage; use the same quantity and in the same way as the bismuth solution.

Third, nitrate of silver, two grains to one ounce of mucilage; inject only four ounces, and let it remain five minutes, then follow with a copious saline injection. To all of these—or whichever one is to be used—may be added tincture of opium, the amount being about twice the amount you would give by the mouth as a full dose, according to the age of the child. Of these prescriptions the first two are preferred. (W. Pepper, M. D., LL. D.)

In general, intestinal irrigation is more useful than enemata. It is valuable in all varieties and in all stages. It may be combined with a small injection of four or six ounces to fill the rectum and sigmoid flexure, but not any more. The small clysters are most valuable when these parts are the chief seat of disease, as in the so-called dysenteric stools. In these cases they are of great value, as are also small injections of ice-water. For tenesmus when not relieved by these measures, suppositories containing half a grain of cocaine may be used, and sometimes they act like magic. In subacute cases our choice is between simple irrigation and high injections of bismuth or tannic acid solutions. Their use may be continued for several weeks with advantage, the injections being alternated from time to time.

During convalescence it is better to stop all treatment with reference to the bowels, and direct our entire efforts in the line of general

tonic measures. The most useful are arsenic, of which one or two doses of Fowler's solution may be given three times daily for several weeks. Iron is one of the best preparations for infants; use the albuminate prepared by Fraser & Company, New York City. The dose is from ten to thirty drops for an infant. Nux vomica may be combined with either of the above; wine, either old port or sherry, may be combined with bitters if there is thought to be any danger of forming a habit. The mineral acids are useful, especially the nitro-hydrochloric acid; two to five drops of the diluted acid may be given after meals, largely diluted in water. Later on cod-liver oil is beneficial.

CHRONIC DIARRHEA OF YOUNG CHILDREN.

The chronic intestinal catarrh of infancy is in a great majority of cases the result of improper feeding. When it occurs in breast-fed infants, the mother's milk may be the cause, especially if the mother is eating articles of food that affect her milk, as cabbages, turnips, sweet-potatoes, etc., or pregnancy will disturb the infant's bowels, and so the mother's milk must be looked upon with suspicion. Sometimes excessive frequency of feeding will derange the digestion in feeble children. No artificial foods are as yet made which will compare equally with human milk; therefore when chronic catarrh in a bottle-fed child does not yield to careful treatment, it may be essential to procure a wet-nurse.

The proper hygienic condition of a wet-nurse should always be looked after; much harm is often done by pampering.

The most generally applicable substitute for human milk is that of the cow, which is made better for infants by sterilizing. For the first three months of the babe's life, the milk should be diluted with two parts of boiled water; for the second three months of life, equal parts of boiled water may be added; after nine months the milk can be given undiluted. Excessive dilution of the milk often confuses a case temporarily, when the only symptoms are that the child is constantly crying, constantly taking food, and constantly urinating. The child is crying from excessive hunger, and urinating constantly to get rid of the water. When any intestinal catarrh refuses to yield to treatment while the child is being carefully fed with cow's milk, artificial foods may be tried. Of these the most popular are largely composed of grape sugar. The various artificial foods have been sufficiently discussed in the article on acute dyspeptic diarrhea to enable one to select those that will be of value in chronic cases.

The hygienic management of the infant suffering from chronic intestinal catarrh is very important. In the summer it should be bathed in cool water and be protected from the heat, and in the winter from the cold, and it should at all times wear a woolen abdominal bandage.

The medical treatment in chronic intestinal catarrh in childhood can be outlined in a few words. The most important principle is

to avoid all astringent remedies as far as possible, and attempt to cure the catarrh, and not the diarrhea, which is its symptom. Mercurials are of value; minute doses of calomel or gray powder may occasionally be given for several days at a time with advantage. Bismuth subnitrate is very much used; it may be given in from five to ten-grain doses three times a day. Intestinal antiseptics are important. Salol, creosote, naphthol, salicylate of sodium, or strontium salicylate may be used from time to time, alone or in combination with bismuth, often very advantageously. The one drug that is most generally used with best results is said to be sodium phosphate; it is rather laxative than astringent, but evidently favorably modifies the intestinal secretions. From five to ten grains of it should be given with each bottle of milk or immediately after the taking of the food.

CHAPTER L.

CHRONIC MEMBRANOUS ENTERITIS.

This variety of chronic enteritis has been designated pseudo-membranous colitis and mucous colic.

It usually occurs in women and sometimes in children. It occurs most often in neurasthenic persons. There may exist two distinct conditions, the one inflammatory, the other a neurosis. The essential characteristic is the discharge from the intestines of a gray mucus, opaque, in the form of membrane or of cords, sometimes a foot or more in length, and of tubular casts of portions of the intestines, often discolored by intestinal contents and even blood.

Symptoms.—Pseudo-membranous enteritis is characterized by attacks of colic, followed by evacuations of the typical discharges. The attacks of colic may last for several days, when relief is experienced, and an interval of months may elapse before a recurrence of the symptoms. With repeated attacks come depression of spirits and hysterical manifestations, and neurasthenic symptoms are frequent. The general nutrition and appearance of the patient may be but little affected. Pseudo-membranous colitis is usually an affection of long duration, and treatment is generally of but little avail.

We have three varieties: First, those cases in which there is habitual constipation; second, those in which there is a tendency to relaxation of the bowels; third, those in which constipation and diarrhea alternate. The management of these varieties of the disease differs, but at the same time has much in common.

Treatment.—In every case the hygienic management must be in accord with the general condition. Neurasthenia may be more pronounced in bad cases; in these the rest-cure should be enforced with a rigor proportionate to the needs of the individual. Then, again, even from the onset a little exercise, gradually increased, is required. Under all circumstances the abdominal bandage should be used day and night, and it must be made to fit, and be kept continually in place. Cool or tepid-water bathing may be indulged in as indicated. The diet should be carefully watched, and should be about the same as in chronic enteritis. Not much sugar should be used. Oatmeal must be prohibited; wheat foods may be used in some cases. Potatoes, beets, and all vegetables which grow under the ground should be strictly forbidden, while spinach, young peas, and lima beans may be eaten sparingly. Macaroni without cheese, rice, and milk foods are usually suitable, and plain pudding and custard may sometimes be allowed. Hot bread and

griddle-cakes are to be interdicted, and even stale bread must be sparingly used. Tea may be allowed, but coffee and chocolate are on the doubtful list. Alcohol in any form should be used with caution; malt liquors are especially injurious.

During the fever stage the patient should be kept quiet, confined in bed. A free use should be made of counter-irritation along the whole length of the colon by means of iodine, or even flying blisters, and full doses of castor-oil should be taken until its effects have become manifest, at the same time using large injections, as described. Two quarts of water at 105 degrees Fahrenheit may be used three or four times a week, with a level teaspoonful of salt or borax added to each quart. A mild nitrate of silver injection, five grains to one quart of water, is recommended to be used once a week. Relief can not be expected until the membranous masses are thrown off. Between exacerbations the treatment varies with the case. The following, containing tar, is recommended:—

℞: Picis liquidæ.....fʒiii
Triturentur cum liquore calcis.....oviii
Ad saturationem et percolentur per
prunum virginianam..... ʒviii

Sig.: Take a wineglassful one or two hours after each meal. This may be given continuously for weeks in every form of the disease.

When there is distinct diarrhea, carbolic acid and bismuth are very useful, prepared as follows:—

℞: Bismuth subcarbonates.....ʒiii
Acidi carbolici.....gr. xv

Misce et dispensa in capsulis xxiv.

Sig.: One or two every two or three hours till relieved of the diarrhea.

No astringent should be employed more severe than sulphuric-acid mixture, with guarana occasionally after meals. When there is constipation it is essential that the bowels be kept freely open day after day, and no hesitation should be felt in the use of laxatives. The daily use of glycerine and castor-oil will help some cases effectually. These laxatives should be varied. Use sodium phosphate, cascara sagrada (aloes, belladonna, and strychnine), or pills (Park, Davies). The following is recommended:—

℞: Sodii phosphatis.....ʒiii
Sodii sulphatis.....ʒj
Potassi iodidi.....ʒj

Misce et fiat pulvis. Subtilissimus. (Mix fine.)

M. sig.: A teaspoonful to a tablespoonful as required, to be taken in water.

Many individuals are greatly benefited by taking, after each meal, one to two tablespoonfuls of sweet-oil with lemon or a little whisky. Any derangement of the digestion from the use of the oil should cause it to be immediately discontinued.

It is thought that the most important part of the treatment in these cases is habitual use of large enemata of warm flaxseed tea, which may be employed three or four times a week, finally reduced to one a week. Two quarts of thin flaxseed tea may be used at a temperature of 105° Fahrenheit; a little borax may be added or ten to twenty grains of boracic acid; or a normal salt solution may be used.

ULCERATIVE ENTERITIS.

Ulcers of the intestines arise from a variety of causes; they usually develop in the mucous membrane, and sometimes in the serous coat. The most conspicuous characteristics of the disease occur in acute and chronic infectious diseases, such as typhoid fever, dysentery, tuberculosis, and syphilis; in constitutional affections, such as scurvy, gout, diabetes, malignant disease, and especially cancer; in those due to sharply-defined causes, as strangulation of the bowels in acute intestinal obstructions or localized disturbances of circulation, and in ulcers of the duodenum, and those from thrombosis and embolism.

Catarrhal ulcers are especially found in the large intestine. They may be few or many, and are often found in the rectum.

The follicular ulcers are usually developed in the large intestine, and sometimes are seen in the ileum and represent one of the results of follicular enteritis in which the inflamed lymph follicles become abscesses and are discharged into the intestines. The ulcer is deep-seated from the commencement.

Retention of inspissated fæces in the large intestines will cause ulcers, called "stercoral ulcers." This variety is said to be of special importance in appendicitis.

Symptoms.—Ulcers of the intestines, whatever may be the cause, are said to have but few characteristic symptoms; extensive ulceration of the intestines may exist, and there be no symptoms specially indicative of this lesion. They are, as a rule, more numerous; and the larger the ulcer, the more likely is diarrhea to be present, and the course of the affection is that of a mild or severe form of acute or chronic catarrhal enteritis. Ulcers may occur in the large intestines with either no diarrhea, or with alternating constipation and diarrhea. When there is any pain, it is of a colicky character and causes persistent discomfort. If there is any tenderness in the region where the pain exists, there may be extension of the ulceration to the vicinity of the peritoneum. Blood, pus, or shreds of tissue in the stools are indicative of ulcer. The pus may be so small in quantity as to be overlooked; it is well to remember this. Shreds of tissue are said to be absolutely characteristic of ulcer. Large quantities of pus in the intestinal evacuations are not so suggestive of ulceration as of the perforation of a neighboring abscess into the intestines.

Treatment.—This should be practically the same as for chronic catarrhal enteritis. Its hygienic management is extremely important.

At no time should any chilling of the surface be allowed; a heavy, well-fitting woolen or silk bandage over the abdomen is vital, and should be worn continuously, being changed day and night. A long-sleeved woolen or silk vest or undershirt must be worn day and night; the ankles should always be well covered and protected from draughts; the patient should on no account be allowed to put the naked foot upon even a carpeted floor, and in cool weather shoes should be worn instead of slippers even in the house. The drinking must be carefully attended to. Ice-cold liquids are to be forbidden, and no sweet drink allowed, nor much wine. In some cases, strong wines, such as port and Madeira, may be given very sparingly; but alcohol, ordinarily, if taken should be well diluted; pure brandy is to be preferred to whisky. Coffee should not be allowed at all; tea may be used in moderation; skim-milk is sometimes advantageous. In some cases scraped steak, Hamburg steak, or broiled or baked tender meats may be given, while veal, turkey, pork, and tame duck are absolutely forbidden. Starchy foods are rarely allowable; toasted breads may be allowed, but the various farinaceous dishes are contra-indicated. Macaroni stewed in milk without cheese agrees with most cases, and rice may be used if necessary to satisfy the craving for vegetables. In general, no vegetables should be taken. Custards and other simple, plain puddings without much sugar, are to be put on all except the strict-diet lists; eggs not cooked may be taken in moderation.

The amount of exercise allowed must be carefully suited to the individual case. Not rarely there is a pronounced exhaustion, and rest in bed with massage is essential; on the other hand, an old enteritis is sometimes benefited by carefully-graded exercise. The main reliance must be upon local treatment. Intestinal antiseptics are chiefly of value, as they benefit complicating conditions of the upper bowel. Bismuth and tar preparations when given by the mouth, may to some extent reach the large intestines. It is said that the most remarkable effects are at times obtained from a large injection of two quarts of water containing one-half to one dram of nitrate of silver. Such injections may be repeated in three or four days and perhaps then once a week. Between these injections the bowels may be washed out with a saturated solution of borax once in three or four days. Fluid extract of hydrastis is recommended to be put into the injections for healing the ulcers.

DIPHTHERITIC ENTERITIS.

The treatment of diphtheritic enteritis is largely that of its cause, with the addition of such general and local measures as have been prescribed under the head of acute and chronic enteritis and of dysentery.

PHLEGMONOUS AND GANGRENOUS ENTERITIS.

When the mucous membrane is infiltrated with pus, the condition is known as phlegmonous enteritis. It is of rare occurrence, and may

be the result of a primary infection of the wall, as in malignant pustules. More often it occurs in consequence of ulcers, intestinal obstructions, strangulated hernia, or fæcal impaction. The symptoms are those either of severe enteritis or of a peritonitis.

Gangrenous enteritis occurs when putrefaction of the necrotic mucous membrane occurs. It therefore represents a stage in the progress of ulcerative, diphtheritic, or phlegmonous inflammation of the intestines. It is oftenest present in dysentery, and is indicated by the discharge of discolored sloughs of an extremely offensive odor, with considerable blood. Further explanation will be found in the article on dysentery.

Phlegmonous and gangrenous enteritis must be looked upon as secondary or complicating disorders, for which there is no other treatment than that of the original cause, with the use of opiates or laxatives or astringents, and of the various local remedies to meet symptoms as they arise, the same as have been advised in the foregoing enteric diseases.

CHAPTER LI.

JAUNDICE (ICTERUS).

Definition.—Jaundice is a pathological yellow discoloration of skin and many of the tissues and fluids of the body, usually, if not invariably, due to bile-pigment, and occurring in many diseases and under a variety of conditions.

Etiology.—It is now generally admitted, since the researches of Stademann, that all cases of jaundice are due to obstructions of the outflow of bile from the liver, and the absorption of its pigment through the lymphatics of the liver; for there is no absorption of bile when the common bile-duct and the thoracic duct are tied.

Any obstruction to the outflow of bile being the immediate cause of jaundice, it is convenient to consider that such obstructions may affect the common and hepatic bile-ducts or the intra-hepatic bile-ducts. Obstruction of the former may be produced by external causes, as constriction from scars or compressions from tumors, whether neoplastic, aneurismal, parasitic (echinococcus), or fecal. The internal causes producing obstruction are inflammation, stricture, tumors, or fallen bodies. The external causes of obstruction of the intrahepatic ducts are the various inflammations of the liver and the tumors and parasites of this organ. Passive congestion and fatty infiltration are also causes. The internal causes are catarrhal and suppurative inflammation, calculi, concretions, and inspissated bile.

New-born babies so frequently become jaundiced that this condition deserves a separate consideration from the same affection occurring in older children and in adults.

The experiments of Stern in removing the liver from pigeons resulted in producing hemoglobinemia, but failed in inducing icterus. From these experiments the presence of the liver would seem to be necessary to produce the jaundice, in addition to a large amount of coloring matter circulating in the blood.

It is generally considered that the coloring matter of the bile is derived from the coloring matter of the blood; but the transformation takes place by means of the liver. In vigorous, healthy infants, the liver will change the liberated hemoglobin into biliary coloring matter in a few days, and this will be eliminated by the excreta. If the infant is feeble or diseased, this transformation and elimination will not so readily take place, and jaundice will be one of the results. Thus the theory of Quincke explains certain cases of icterus on the ground that the ductus-venosus may remain open for some time after birth, thereby

allowing a part of the portal blood containing bile to pass directly into the general circulation. Ashby reports a case in which an autopsy showed the ductus-venosus to be widely open in a jaundiced infant who died on the eleventh day. He believes that this duct is liable to remain open longer in feeble and immature infants than in more vigorous ones. Jaundice is certainly much more likely to develop in the former than in the latter class of infants.

Symptoms.—The intense condition of the skin noticed during the first few hours or days of life, often produces a yellowish coloration that can not be considered a jaundiced state, since it is dependent upon a secretion of bile. The yellow tint is at first seen only on deep pressure, but as the redness fades away, the yellowness increases. The conjunctivæ are colored, and the urine appears normal. The yellowness is noticed on the second day, and may continue a few days or a week. This discoloration of the skin is more often seen in cases of prolonged labor and in difficult labor, in infants born asphyxiated or before term, and, in general, in feeble infants.

Grave icterus neonatorium is, fortunately, very rare, and may be produced by several different conditions. Defects in the bile-ducts will first be considered, as among the most common causes. In some cases all the largest bile-ducts have been absent; in others, as reported, the ductus communis choledochus has been narrowed or obliterated, or is entirely absent. Sometimes a fibrous cord has been found in place of the gall-duct. The cystic duct has been absent, and the gall-bladder is in a rudimentary condition. Accompanying an obliteration of the gall-ducts, a condition of cirrhosis is usually found in the liver, which will be more or less marked according to the length of time that the infant survives. The liver is usually found enlarged.

Another grave form of icterus in the newly-born is seen in connection with septic poisonings. That is generally accompanied by umbilical phlebitis. Shortly after birth, the umbilicus is a very dangerous spot for the entrance of septic poisons. Infected air or pus can readily enter the umbilical vein from the umbilicus, and thus start up umbilical phlebitis and general septicemia. This grave accident is liable to occur when the mother is in a septic condition. The poison may be introduced by bacteria, which are probably the same agents that produce the puerperal fever. In these cases of sepsis there is a puriform or yellow softening of the thrombi that fill up the umbilical vein. This sets up an inflammation not only in the vessel itself, but in the surrounding tissues. Infecting emboli may be carried to various parts of the body.

The septic form of jaundice comes on shortly after birth, usually within a few days, and is soon well marked.

A third cause of grave icterus neonatorum is found in certain inflammatory changes in the liver, usually taking the form of an interstitial hepatitis, and may be conjoined inflammation of the biliary canals.

Diagnosis.—The first point is to make the differential diagnosis from false jaundice. In the false case, the discoloration being due to the remains of a severe cutaneous congestion, there is a yellowish-brown tint usually present, while in true jaundice the color of the skin is more markedly yellow. In true jaundice the conjunctivæ and urine usually present an icteric tint which is absent in false jaundice.

Septic jaundice must be treated by free stimulation and all other measures that can be employed in sepsis. In cases of umbilical hemorrhage, applications of strong astringents, such as the perchloride or subsulphate of iron, may be made. It may be necessary to apply a ligature around two harelip pins inserted through the skin at the navel.

JAUNDICE IN OLDER CHILDREN.

The jaundice that attacks older infants or children is due to causes that are similar to those found in adults, which have been described in foregoing articles.

Symptoms.—The yellow discoloration of the conjunctivæ and skin is the same as in icterus neonatorum. A symptom often noted is a slow pulse, perhaps forty or fifty beats to the minute, as bile, when present in the blood, has a sedative effect upon the circulation. The biliary salts in the bile are the ingredients that produce this effect. If there is much slowing of the circulation, the respiration will likewise diminish somewhat in frequency. The most marked symptom is duodenitis or a gastro-duodenitis. In the latter case there is more or less nausea and vomiting, with pain in the epigastrium, especially upon the ingestion of food. There may be a subacute duodenitis without gastritis being present. If so, there is pain and distress when the food passes from the stomach into the duodenum, which usually occurs some hours after the taking of nourishment. Conjoined with this there is tenderness on pressure below the epigastrium at the situation of the duodenum. In these cases a plug of mucus is said often to be found in the common duct where it opens into the duodenum; also the disturbances from obstruction to the passage of bile into the duodenum, depend upon the absorption of bile-pigment and bile-acids and the absence of bile from the intestinal contents.

Within three or four days after the obstruction has taken place —and the earlier, the more sudden and complete the obstruction—the skin and visible mucous membrane become yellow. This color is first seen in the conjunctivæ. Discoloration of the urine may be noticed even earlier than that of the skin; and as it increases in intensity, it assumes a dark-brown color, resembling porter. The urine readily foams when shaken, and the froth has a yellowish color. The quantity, reaction, and specific gravity are normal, and there is neither albumen nor sugar. The stools are clay-colored, from an excess of undigested fat, while no bile reaches the intestines. The complete absence of bile is shown by a quick decomposition of the intestinal contents, as exhib-

ited in the free formation of gases and the foul odor of the fæces when voided. The bowels are usually constipated. Itching of the skin may cause great annoyance, especially at night when the skin is warm. Uticaria, which is an exceedingly common affection in children, may occur as an obstinate complication, when the papules and wheals will present a deep yellow tint. Jaundice may persist for a long time without giving rise to much apparent disturbance, as the system assumes a tolerance of an excess of bile.

Diagnosis.—Evidence of the existence of gastro-duodenitis must first be sought for. When there is no nausea or vomiting, with pain about the region of the epigastrium that has preceded and accompanied the jaundice, these conditions may be recognized as causative. If the ducts are inflamed from other causes than a duodenitis, such as a roundworm in the common duct, the diagnosis, it is said, can not be made during life. If careful palpation reveals a distended gall-bladder, there is positive evidence of obstruction in the common duct.

In cases in which jaundice is merely a symptom of some structural affection of the liver, not only diagnosis, but also treatment, must be adjusted with reference to the latter lesion. The jaundice is simply one among many other symptoms.

It is necessary to bear in mind the fact that jaundice may be distinguished from other abnormal tints of the skin simulating it by the yellowish conjunctivæ and by the presence of biliary pigment in the urine. The latter condition is absent in the yellowish-green tint sometimes seen in chlorotic girls, and in any other abnormal discoloration of the skin.

Prognosis.—The prognosis, of course, will depend upon the ascertained cause of the jaundice. A jaundice that persists indefinitely, even where no organic disease can be found, must not be regarded without apprehension. If the general health and strength are good, a jaundice may last for several months without causing any special alarm; but cases that persist for one or two years are apt to produce grave changes in the nutrition of the patient. Sometimes even mild cases of jaundice may suddenly present evidence of blood-poisoning, which may be followed by death. Fortunately, the majority of cases of jaundice seen in young children disappear in a few weeks without leaving any serious consequences.

Acute jaundice lasts several weeks; chronic jaundice extends over several months or years. Acute jaundice—catarrhal—usually terminates favorably within six weeks; yet fatal yellow atrophy of the liver may be preceded by a fortnight of apparently simple catarrhal jaundice. Acute jaundice from gall-stones, as a rule, rapidly subsides with the cessation of the biliary colic. The prognosis of acute febrile jaundice is uncertain during the persistence of the fever, in consequence of the gravity of the complications which may arise. Chronic jaundice, especially when increasing in intensity, is of serious if not grave impor-

tance, particularly if without fever and pain; then persistence, with cachexia, is suggestive of malignant disease of the liver.

Treatment.—The treatment of jaundice is often necessarily empirical. Whatever the cause, certain symptoms are usually present that must be alleviated by treatment. Persistent constipation is one of the commonest of these symptoms. Small doses of aloes, rhubarb, or castor-oil will fulfil this indication.

Drugs which act by irritating the trouble must be avoided in the common cases of duodenal catarrh. The saline laxatives or mineral waters are best used to cause a suitable action of the bowels when there is catarrh of the duodenum. Carlsbad, Vichy, and Congress waters usually act well. Great care must be paid to diet, only bland and easily-digested foods being allowed. All fatty articles must be restricted, and the patient kept upon lean meat and plain vegetable food. In some cases counter-irritation in the shape of a small blister at the epigastrium appears to do good. Active peristaltic action in the duodenum may be transmitted to the bile-ducts, and thus in the beginning an obstruction may be overcome. Calomel, rhubarb, aloes, and colocynth may be used in these cases. The action of an emetic, by forcibly compressing the liver and bile-ducts, may free the passages from obstruction. Alkalies, the bicarbonate of sodium and potassium bicarbonate, are supposed to have a liquefying effect upon the bile, and thus to free the ducts when they are occluded by a thickening of this secretion.

Tincture of nux vomica may be combined with advantage when one of the sodium salts is prescribed. Nitro-hydrochloric acid is highly recommended by some authorities. Henoch claims good results for it in obstinate catarrhal jaundice.

When jaundice persists, and resists ordinary treatment, efforts must be directed to eliminating some of the bile from the system by means of the emunctories. This is said to be done by the kidneys and cutaneous glands. The mild vegetable diuretics, the acetate of potassium, and various mineral waters, such as seltzer, have been recommended. It is advised to give lemon juice also, from one to three ounces daily to an adult. It agrees with digestion and excites an abundant diuresis. The skin may be kept acting freely by means of warm baths, and by having pure flannels worn to guard against changes of temperature. Everything must be done to support and invigorate the system, so as to obviate as far as possible the depressing effects of the cholemia.

The first sign of improvement, in case of a favorable issue, will be the disappearance of the biliary coloring matter from the urine. The real affection has then ceased, although the skin may retain its jaundiced hue for some time longer.

CHAPTER LII.

DISEASES OF THE BILIARY DUCTS.

Affection of the biliary ducts in children practically resolves itself into an inflammation secondary to a like pathological condition of the gastro-intestinal mucous membrane, as the lining membrane of the duodenum is directly continuous with that of the bile-ducts; also to the occasional wandering of entozoa from the intestine into these ducts.

CATARRH OF THE BILIARY DUCTS.

A catarrhal inflammation of the ducts of the liver will produce changes similar to those seen in other mucous membranes. The mucous membrane of the gall-bladder may be the seat of catarrhal inflammation and the ducts not be involved. This is said to take place from thickening and alteration of bile that has remained for a long time stagnant in the gall-bladder.

Etiology.—Acute indigestion produced by overloading the stomach with all kinds of improper food and drink stands as the common cause. Certain infectious diseases, and acute or chronic malarial attacks may cause enough gastro-duodenal irritation to provoke an actual catarrhal inflammation.

Symptoms.—In the beginning there are apt to be various digestive disturbances, shown by coated tongue, nausea or vomiting, and disinclination to take food. There may be slight fever and other symptoms pointing to a mild catarrh of the stomach. In a few days the conjunctivæ begin to be tinged with yellow, and the urine is colored by biliary pigment; soon a marked jaundice develops, and the fæces lose color and become clay-like in appearance. There is often a slight enlargement of the liver, which projects a little below the ribs, and the gall-bladder may likewise be felt projecting below the margin of the liver, assuming a sort of pear shape. The jaundice accompanying this affection generally lasts two or three weeks, although it may not disappear for two or three months when the inflammation of the duodenum and bile-ducts is severe and chronic. At first there is tenderness on pressure over the epigastrium and right hypochondrium. Its duration will, of course, depend upon the nature of the original hepatic disturbance. If the gall-bladder alone is the seat of catarrhal inflammation, there will be no jaundice, and the symptoms in general will be very indistinct.

Diagnosis.—This consists in recognizing the existence of a gastro-

duodenal catarrh, or seeking carefully for some affection of the parenchyma of the liver that may induce a catarrhal inflammation of the biliary ducts.

Treatment.—The treatment is essentially the same as that recommended for ordinary jaundice in children.

ROUNDWORMS IN BILE-DUCTS.

It rarely happens that roundworms find their way into the biliary ducts and produce grave or fatal symptoms. The worm enters by the common duct into the gall-bladder from the stomach. Cases are recorded where a worm has been found partly within the common duct and partly in the duodenum. The symptoms are said to be too obscure to warrant a diagnosis. There may be acute pain in the epigastrium, with vomiting, and finally convulsions. Treatment must be directed to symptoms.

LITHEMIA.

Children often suffer from a functional disturbance of the liver that gives rise to various digestive and nervous symptoms. The principal evidence of faulty nutrition will be found in the urine. The tongue is coated, and the breath offensive. Constipation is usually present, and the stools are pasty, like bile. There is an unhealthy appetite, sometimes abnormally large, and the children have a pale, sallow appearance. Complaint is commonly made of headache. Young children become extremely fretful when suffering from this affection. They wish to urinate frequently, and a reddish-pink sediment of urates is deposited in the chamber. Anemic girls are very apt to become lithemic before or at the time they begin to menstruate.

Treatment.—The first object of treatment is to get the bowels acting regularly; a few small doses of calomel may first be given, followed by fluid extract of cascara sagrada or aloes. Nux vomica combined with an alkali such as bicarbonate of potassium, or an acid such as dilute hydrochloric acid, may then be administered. Good effects will often be obtained by changing from an acid to an alkali, or *vice versa*. The diet of the child should be carefully regulated. Too much meat, as well as an excess of starchy foods, must be avoided. Pastry and sweets must be withheld entirely. Plenty of outdoor exercise, well-ventilated rooms, salt baths with friction of the skin, and all kinds of beneficial hygienic measures, may be employed with great advantage.

CHAPTER LIII.

ACUTE AND CHRONIC CONSTIPATION IN CHILDREN.

Definition.—This condition involves a delayed expulsion of the fæcal matter, a retention of intestinal excrementitious substances beyond the normal period, infrequent or incomplete alvine discharges, or a scarcity or complete absence of fæcal evacuations.

Constipation is not so much a disease in itself as it is a symptom of various morbid conditions. There are certain anatomical, physiological, and dietetic reasons for constipation in children that do not exist in the adult. The small intestines are relatively longer and the caliber smaller in children than in adults. The walls are also thinner and weaker. The ascending and the transverse colon are shorter compared with the adult, and the descending portion is longer. According to Jacobi, the length of the intestinal tract in children, with its tendency to overlap and elongate, is a cause not only of constipation but also of the more serious surgical difficulties, such as intussusception, etc. Treves has pointed out the anatomical changes in the colon that almost always attend chronic constipation.

Physiology.—In a healthy child the mother's milk is almost entirely absorbed and assimilated, leaving but a small residue, and the amount of material evacuated has some relation to the amount taken into the system. The albumen of the milk is nearly all digested in the stomach and bowels of the child, and from this very process we have a physiological cause of constipation in children, fæcal matter existing in such small quantities that intestinal peristalsis is not excited; in older children and adults, if constipation has not become habitual, the rectum is usually empty. When defecation is regular, the fæcal mass descends into the rectum and produces the uneasy sensation which precedes a healthy evacuation. If this call is not heeded, a reverse peristalsis is excited in the walls of the rectum, and the fæcal matter is returned to the sigmoid flexure. If this neglect becomes habitual, the return to the upper bowel does not take place, and an accumulation follows, with all its attendant evils to pelvic circulation.

In a small number of cases, one evacuation each day may be sufficient; but frequently where this is the case some of the deleterious results of constipation will be noticed. On the other hand, we have frequently noted from three to four movements each day, and have found by actual weight of the child, a normal increase from week to week, with every other indication of good development. From one to four passages each day, then, would be regarded as normal. Devia-

tions from the normal have been noted, such as an evacuation every time a napkin is changed during the first year of infant life, to a passage once in seven or eight days, and in the older literature instances are recorded of a single passage in several months. A gradual increase in weight and a generally good condition of nutrition must be our guide in deciding this question.

Constipation is undoubtedly more frequent in adults than in children; in adults it is perfectly natural for at least three or four evacuations of the bowels to take place daily. Between the first and second year it is normal for two daily movements to take place. In all probability what we call family peculiarities are largely due to neglect of proper attention to the wants or habits of children, or to the perpetuation of a family habit of continually giving and taking purgatives. In every case it is necessary not only to inquire as regards this family peculiarity, but also to consider the character as well as the frequency of the intestinal discharges. Interference with normal peristalsis, which may come from many causes, will produce most remarkable variations in the normal evacuation as well as in the nutrition of the child.

Etiology.—We will consider the infant at breast first, more especially the causes of constipation, and then the older children. A constipated habit on the part of the mother has frequently something to do with the constipation of the child. The mother's milk sometimes contains too much caseine or too little sugar, and in other cases is so thoroughly digested that but little residue remains, and constipation ensues. (Bouchard.)

A sluggish condition of the muscular coat of the intestine, a diminution in the secretions either from the mucous membrane or from the glandular apparatus, and improper food, are other causes, to which may be added imperfect muscular development in feeble and delicate children.

Artificial foods, including condensed milk, in many instances produce diarrhea, but in other cases give rise to constipation; and any food which absorbs quickly, leaving little or no residue, will produce this condition. To obviate this, if water has not been used as a diluent, oatmeal water should be substituted. In older children solid food, or vegetables with a large residue, or fruits, such as bananas, with an insufficient amount of liquids, in connection with a condition of the bowels favoring retention, are frequently causes of constipation. Overstimulation and consequent atony of the bowel, whether from coarse food, frequent purgations, or large enemata, are also causes.

Among other articles of food which may produce constipation are rice, arrowroot, boiled milk, and tea. Impaction of the bowel, especially in the lower part, may take place from a variety of causes, such as large masses of hardened fæcal matter, fig pits, raspberry seeds, and stones from fruits. It is believed that intestinal worms will give rise to the conditions described. Deficient intestinal secretion, by produc-

ing a hard and pebbly condition of the fæcal mass by the time it reaches the colon and rectum, causes constipation. Where there is a deficiency, particularly in the bile or other secretions, and articles of food which cause fermentation are taken, an enormous accumulation of gas may take place, producing not only constipation, but sometimes convulsions.

All kinds of medicines administered to quiet pain or restlessness, whether prescribed by the physician or nurse, are constipating. The same may be said of many tonics which contain astringents, particularly tannin; also the too free use of aperient medicines, producing overstimulation and subsequent enfeeblement of muscular activity.

All local diseases of the rectum, as fissures and hæmorrhoids, producing painful passages, predispose to constipation in children the same as in adults. The child delays its normal movement from dread of stool on account of pain, and soon there results distention of the lower bowel from accumulation, which, although secondary, produces the malady under consideration. A neglect of inculcating habits of regularity in going to the closet, the false modesty felt by young girls, especially when traveling, the inactivity of indoor life and a want of exercise, induce constipation. In most young girls subject to constipation, we invariably find anæmia and neuralgia.

Constipation is also due to hernia, intussusception, intestinal obstruction from carcinoma, and congenital malformations of the rectum. It may be caused by chronic peritonitis, by tumors, and, in the female child, by a retroflexed uterus. (C. W. Earle, M. D.) Many other causes produce constipation, as cases of meningitis, myelitis, hydrocephalus, and microcephalus in children.

The bowels are sluggish in the diseases of the cerebro-spinal system; this is said to be due, in part, to interruptions in the motor nerve-currents, or to a state of tonic contraction in the abdominal and intestinal structures. Finally, in many of the chronic and wasting diseases, especially those enfeebling the muscular movements having to do with defecation, and, in general, producing a low condition of the system, constipation is present.

CONSTIPATION FROM PARALYSIS OF THE INTESTINES.

Constipation may result from either primary or secondary inflammation of the muscular coat (by extension from the mucous membrane). It is not uncommon to find in children ulcerations of the mucous membrane which had previously caused diarrhea, suddenly give rise to considerable abdominal distention and a most obstinate constipation.

AFFECTIONS OF THE NERVE-CENTERS.

In disease of the brain and its membranes, as in tubercular-meningitis, constipation is almost always the rule, and sometimes in acute meningitis; also in serous or hemorrhagic meningeal effusion, in softening of the brain, in cerebral congestion, and in tumors of the brain.

Affections of the spinal cord or its membranes—as spinal meningitis, congestion, or hemorrhage, acute or chronic myelitis and tumors—are more frequent causes of constipation than are cerebral affections. A most obstinate constipation due to paralysis of the sphincters of the anus, sometimes marks the onset of locomotor ataxia. Paralysis of the diaphragm or of the abdominal muscles, or neuralgia of these muscles, leads to constipation, by preventing their action, the least motion occasioning pain.

CONSTIPATION FROM REFLEX INTESTINAL PARALYSIS.

This is said to be the result of affections of organs more or less in the vicinity of the intestines, as a testicle retained in the inguinal canal becoming inflamed; or affections of organs connected with the intestines, as hernia of the vermiform appendix, umbilical hernia, and abscess in the iliac fossa. A proof that constipation resulting from the above causes is reflex, is afforded by the fact that the phenomenon of paralysis is preceded, as in all reflex paralysis, by signs of irritation, as pain, vomiting, and abdominal distention. To the above causes may be added lack of sensibility of the mucous membrane of the intestines. The result of this is seen in persons who do much brain work, or lead a sedentary life, and who make an abuse of rectal enemata, or of certain medicines, as opium, purgatives, etc., which act by diminishing sensibility of the mucous membrane. Opium, however, would cause paralysis of the muscular coat.

CONSTIPATION FROM AN ALTERED STATE OF THE BLOOD.

This cause, as stated by Maingualt and others, produces constipation either by its effects on the intestinal secretions, or by its direct influence on the nervous system. Thus, in convalescence from acute diseases, we may have paralysis of the muscles of the intestines, as we have of the other muscles, as has been observed after diphtheria.

We have constipation from causes interfering with chymification,—from cancer and ulcer of the stomach, gastritis, acute or chronic, insufficient alimentation, and improper food and drink—frequent causes in children—moral causes, physical suffering, vicissitudes of all sorts,—in a word, all causes of dyspepsia; also from duodenitis, acute enteritis, fevers, intestinal dyspepsia, hepatitis, and cirrhosis of the liver, and catarrh of the bile-ducts.

CONSTIPATION FROM MECHANICAL OBSTRUCTION FROM WITHIN.

The introduction of foreign bodies, as worms, gall-stones, polypi, large hæmorrhoids, and tumors of the rectum, invagination, volvulus, etc., diminished calibre of the intestines from hypertrophy of its coats or new growths,—these are among the causes of constipation.

Pathology.—Constipation affects different children differently. The full-blooded and bilious child needs more frequent evacuations

than the spare and anemic one. It seems to be clearly established that the retention of meconium will occasionally produce convulsions. Schlumberger cites cases which demonstrate this beyond any reasonable doubt. In infants we find constipation producing repeated attacks of colic, which may disappear without alarming symptoms if speedily relieved, but if long continued, bring about a swollen and distended condition of the bowels.

Prolonged constipation in the young child produces disease in the cæcum,—chronic inflammation, and in some cases induration and thickening; perforation of the intestines occasionally takes place. Among other serious consequences that sometimes occur are the different forms of hernia, varicocele, prolapse, fissure, catarrh of the bladder, spermatorrhœa, and especially hæmorrhoids. The nerves in the pelvis may also be pressed upon by fæcal matter, and disturbed sensibility, and pain or weakness in the lower limbs, will be the result.

Chronic constipation with accumulations in the colon produces dyspnœa, also disturbances in the thoracic circulation. Palpitation, irregularity of the pulse, and vertigo frequently result; and in anæmic girls we find rebellious headaches, hypochondria, and morbid thoughts. The same causes, when present in the lower part of the abdomen, produce, in a few cases, difficult and frequent micturition.

Habits of constipation due to neglect in school-days will frequently follow a patient for years, and have much to do with the production of chlorosis in girlhood.

Symptoms.—Occasionally acute constipation will produce a condition which may jeopardize the health, if not the life of the child, but this is not usual.

In a nursling a single evacuation each day, attended with straining, is constipation, which, in many cases, inclines to become worse, until a movement of the bowels can be produced only by medicines or injections. The usual symptoms found in such a case would be the infrequency of evacuation, the slight hardening of the fæces, and the difficulty of their expulsion. Where a child is robust, and a proper amount of food is taken, and there is but a single passage daily, the symptoms are diminished appetite, increased volume and resonance of the abdomen, colicky pains, fulness, and a feeling of weight in the lower bowels. If this continues for another day, the face is flushed, the head somewhat hot, and the child nervous. In many young children we sometimes notice a pallor of the face, and rarely a jaundiced condition of the skin; indeed, a true jaundice sometimes supervenes from pressure on blood-vessels and consequent obstruction. From the condition just mentioned the general nutrition of the child would suffer, and reflex action, such as convulsions, might ensue. Constipation in children under two years of age sometimes causes high fever with slight facial convulsions and grimaces which simulate nervous affections.

In some forms of constipation there occasionally occurs a peculiar kind of diarrhea, produced as follows: The hard fæces, acting as a foreign body, produce a more or less abundant fluid secretion, which finds a point of exit either between the fæcal masses and the intestinal wall, or through a lumen dug out of the fæcal accumulation. (Roche.) Thus an obstinate retention of immense masses of excrementitious stuff may be mistaken for, and treated as, a case of diarrhea.

Along with other symptoms in older children, as heretofore described, with a distended abdomen there is furred tongue, hot mouth, offensive breath, headache, and sometimes vomiting, difficult breathing from abdominal distention, and in girls a condition is present which in after life may develop a misplaced uterus. Pain and uneasiness referred to the bladder are produced, and from this and other causes, bladder and kidney trouble have been suspected when only constipation existed. In some children, also grown people, where constipation has become habitual, there is a change in the habits and character. Those fond of work and study can do nothing on account of a persistent headache, and while no physical signs of disease can be found, they are morose and melancholy.

The constant bearing down which is present in chronic constipation may produce hernia, hæmorrhoids, fissures, and other symptoms referable to the rectum.

Stubborn constipation may give rise to fæcal accumulations and symptoms of intussusception. Marmaduke Shields narrates a case in which motions "like pebbles" were passed; then came incessant vomiting, discharge of blood and mucus from the bowels, and prolapse. Syncope occurred, with profuse sweating, and death seemed imminent. At this time a hard, irregular swelling in the left lumbar region was discovered, and an examintion per rectum established the diagnosis of accumulation and impaction.

Diagnosis.—It should always be remembered that a small amount of fæcal matter evacuated by a child whose alimentation is sufficient as regards quantity, should not be regarded as indicating constipation. In the acute variety there will be infrequency of normal passages from the bowels, pain upon pressure of the abdomen, accumulation of gas, a coated tongue, and a hot mouth.

Prognosis.—The prognosis is always regarded as good; also the prognosis in chronic constipation is regarded good as to life; but locally it produces diseases of the rectum, hæmorrhoids, fissures, and hernia. In some cases such a degree of stenosis is produced that the most serious results are anticipated, and laparotomies have been performed with the expectation of finding intussusception, etc. To avoid such mistakes, a very large injection of warm water should be administered in the recumbent position, or insufflation of air should be made before the operation is commenced.

Treatment.—The number of drugs administered to infants, children, and adults, is surprising, if not alarming. Castor-oil, gray powder, calomel, senna, aloes, scammony, jalap, podophyllin, belladonna, rhubarb, cascara—besides the favorite powders of different doctors—are all given in various combinations. For the nursling, except in an emergency, they are useless, and should not be given. The indications are to correct the condition either by attention to the mother or by a slight change in the food of the child, and to avoid laxatives.

After excluding congenital defects, we must look to the mother for the cause. If an evacuation of the bowels does not occur within twenty-four or thirty-six hours after birth, a careful examination of the anal opening should be made; in some of the large lying-in hospitals a very small enema is given as a part of the baby toilet at the first dressing. This demonstrates at once the perviousness of the canal. Change the mother's diet; thereby you will correct the constipation of the infant. It may be necessary to administer a mild laxative to the mother; for, as a rule, simple constipation in the child should be overcome without giving it medicines or injections. If a child has been provided with a wet-nurse and is constipated, the question will arise as to the propriety of changing to a wet-nurse with younger milk in order to furnish more colostrum and less casein. Everything of a constipating nature, including starchy foods, is to be excluded from the diet of mothers or wet-nurses when the infants are constipated.

If these directions are followed, and yet the habit persists, and the child has but a single dry passage each day, and this is attended with straining, some very simple remedies may be given. The most simple laxative for a new-born infant is a little molasses—New Orleans molasses seems to act best—a teaspoonful in a little warm water administered when needed. When the passages are very dry, and the child is known to perspire freely, we should suspect an insufficiency of water in its system, and to overcome this there is nothing better than pure water internally. As a rule, babies are much neglected in this respect. All babies should have water daily; it is an infliction to deprive a child of water; the deprivation is not only a cause of constipation, but sometimes of absolute suffering on the part of the child. A baby is not always hungry when it cries, it is often thirsty. To feed it when it is only thirsty, and not give it the water it craves, will sometimes aggravate constipation. Remember, then, that one of the most efficient remedies in the treatment of children is water given three or four times during the twenty-four hours. To a child accustomed to a mixed diet, in place of water oatmeal water may be given for a time, in order that the child may be nursed less frequently.

If the measures already suggested do not give relief, of course other treatment must be adopted, and we come to consider local stimulants which may be introduced into the rectum. Soap, glutin, or glycerine suppositories are suggested; molasses candy molded into lit-

tle masses and introduced, and injections of very small quantities of glycerine and water, the nozzle of the syringe being oiled before insertion. Bohn recommends injections of cold water three times a day if needed, then twice a day, and finally once a day until the cure is assured. Other writers recommend a little common salt added to the cold water.

If enemata are necessary, either warm or cold, small quantities must be used, one or two teaspoonfuls of water, with perhaps ten to twenty drops of glycerine added, being considered very efficient. Large injections of any fluid should be avoided, not only because they dilate the colon and paralyze the lower bowel, but because they are liable to produce discomfort in the infant by crowding against other internal organs, producing difficult respiration and interference with circulation. In the case of a few infants, growth and nutrition seem to progress naturally in every respect, with but a single passage each day, and with such it is not necessary to interfere. If drugs must be given to the nursling, nothing will yield better results than minute doses of calomel, or small doses of castor-oil, or of magnesium carbonate, grs. x to xv to ʒi of water and syrup, given in teaspoonful doses as needed; or a grain or two of the magnesia may be given in a little sweet milk.

In older children we should endeavor to inculcate the habit of regularity by seeing that attempts to evacuate the bowels are made. In all cases the constipation should be removed; but let there be a cooperation of habit, expectation, and will, with laxative foods, before we resort to drugs. Teach older children that they must go to the closet every morning; just after breakfast is an important time to form the habit of having a natural movement. Mothers should be watchful of their children from birth till the child is old enough to attend to itself. In children one, two, and three years old, massage and irrigation of the bowels are very useful, being much better than suppositories, soap in particular tending to irritate the bowels and produce local inflammations.

Children on a mixed diet should avoid the starchy foods and eat more soups and drink water freely; let the food be somewhat coarse, well masticated, and swallowed slowly, and avoid giving the same food repeatedly. If the digestion is good, more milk may be added to the food; a little oatmeal will increase its coarseness, and a few drops of molasses make it slightly laxative. This may be changed from day to day to mush made from unbolted wheat-flour, or cornmeal, or to bran in bread and milk, prepared by soaking the bran in the milk, warming, and then adding the bread. Whey, when it can be obtained, is of great benefit. Children who are two or three years of age may be given stewed fruits or baked apples. Small quantities of fruit, particularly grapes without skin or seed, and figs and dates, are useful. At the age of three and upwards, we advise home gymnastics, swimming, and salt bathing.

Children, as well as grown people, invariably bear calomel in but small doses; it should be given in one-twentieth down to one-tenth or to one-fourth, according to age; it may be given every hour till four or six doses are given; then follow by a little magnesium next morning to move off the calomel if needed. Calomel is not recommended in rachitic diathesis. Castor-oil paste, made by rubbing together powdered acacia, castor-oil, syrup, and glycerine, and flavoring with anise or vanilla; or gray powder with a little bicarbonate of sodium, or powdered liquorice (pulv. glyccyrrh, comp.) with sulphur, may be administered to rachitic patients. The small doses of belladonna and nux vomica will be found a combination very serviceable in giving tone to the bowels or for relieving spasms. Magnesia and asafœtida are especially useful in relieving the distressing symptoms of gas or flatus.

The family physician should see to it that the older children do not eat those articles which are known to constipate; forbid spices, cheese, dried fruits, and the coarser dry foods. Medicine should not be employed for failure to evacuate the bowels every day, but attempts should be made to remove constipation by attention to diet, rubbing the abdomen, and the use of moderate exercise. If drugs must be taken, find the one which agrees with the patient, and then the dose which is suited to the case; then gradually reduce the quantity of medicine till the diet, which has been corrected, keeps the bowels in a normal condition. The fluid extract cascara sagrada, in doses of one or two drops, will be found an excellent remedy. For a child of two years, clear out the bowels with a powder containing one-half to one and one-half grains of calomel with a little compound liquorice powder; follow for a few days with carbonate of magnesium (℥ii to water ℥j) give one to three teaspoonfuls each day till the bowels are relaxed. Then give non-astringent iron preparations or nux vomica. Dr. H. H. Clark recommends especially small doses of calomel, and one-twentieth of a grain to one-halfor one-grain doses of ipecac, as the remedy for constipation in children.

The headache and coated tongue, the nervous and feverish symptoms, with dizziness, which we find associated with constipation and possible diagnosed as biliousness and indigestion, can not easily be cured by neurotic remedies. First clear the bowels (this applies to adults) of their accumulated filth, then give a remedy to act on the secretions, such as calomel, gray powder, and afterwards give iron, nux vomica, and magnesia.

The galvanic current of electricity alternately with the faradic current is very beneficial in aiding the removal of constipation. Several portions of the bowels respond differently to the application of the faradic and galvanic current. The galvanic is usually the stronger. Local contraction results from the negative pole, peristaltic waves from the positive. Apply the negative pole in the rectum and the positive over the abdomen along the colon. By gentle massage or kneading of

the abdomen over the colon and in the direction of its peristaltic movements, muscular action is stimulated and the desired results are frequently brought about. This process should be repeated two or three times a day. Cod-liver oil and syrup of the iodide of iron are especially useful in the rickety and strumous diatheses.

Children with indigestion associated with constipation should always have first a corrected diet, then pepsin in combination with muriatic or hydrochloric acid, and cascara or compound syrup of taraxacum.

There are cases where the accumulations of fæcal matter must be removed by the more powerful cathartics and by regular irrigation, which sometimes must be carried into or through the mass by means of a tube.

An impacted rectum must be cleaned by the use of the syringe, and occasional digital assistance will be required.

CHAPTER LIV.

PARASITES OF THE INTESTINAL CANAL, AND DISEASES DUE TO PARASITES.

As a rule, the animal parasites which find their way into the human system, enter the body in the food or drink, and either remain permanently in the intestinal canal, or, migrating from this region, are to be found in the remotest parts of the body; while other parasites infest the skin, are capable of extensive migration, and produce simply local disturbance. (Molsler and Piepes.)

The varieties of verminous parasites found in man are the tapeworm, the flukes, the leeches, and the round and threadworm.

TAPEWORM, OR CESTOID.

This parasite includes the several varieties of tænia, or tapeworm, which prove injurious to man by their presence in the intestines, and especially by their occurrence in the larval stage in the various organs and tissues of the body. From the mature worm which lives in the intestines of man or of a lower animal, are discharged eggs, either free or included within the segments. If these eggs are swallowed by man or by different lower animals, the envelopes are digested and the embryos set free. The latter penetrate the walls of the blood-vessels and lymphatics, and are then carried to various parts of the body, in which their development into cysts,—the cysterci,—takes place. These cysts are the larvæ of the tapeworm, and when swallowed become the tapeworm. *Taenia solium* and *taenia saginata* most frequently occur in man.

Taenia Solium.—The pork tapeworm, six to nine feet long, has a round head the size of a pin-head, armed with twenty-six hooklets in a double row, rising from a pigmented base, and provided with four suckers. The narrow neck soon becomes transversely lined, an indication of the formation of segments, which, some three or four feet from the head, are square instead of being elongated. In the fully-developed segments from the four hundred and fiftieth downward, both the male and the female generative organs are found, and the uterus is readily seen, on pressure of the proglottid between plates of glass, as an arborescent figure with a central trunk, from each side of which project eight or ten lateral branches. After the tapeworm has been in the intestines for three or four months, the mature segment, nine to ten millimeters long and six to seven millimeters wide, may be found in the stools. From the eggs taken into the stomach of man, swine,

sheep, dogs, and rats, is developed the *Cysticuercus cellulosae,* to be found in the various parts of the body; in hogs the condition thus produced is called measles.

The *Taenia solium* lives in the middle of the small intestines, to the walls of which it clings by its hooklets, and may remain alive for several days after the death of a patient. Although usually found alone, several may be present, and Kleefeld observed forty-one in the same individual. The *Taenia solium* is very common in central Germany, where raw or insufficiently cooked pork is often eaten; and from one-third to one-half of the patients seeking hospital aid for various causes are said to be affected with this parasite. (Wood.)

In regions in which pork is but little eaten, or in which the cooking or various methods of its preparation have destroyed the vitality of the eggs, the tapeworm is comparatively uncommon.

Taenia saginata, the beef tapeworm, is twelve to twenty-four feet long, and has a square pigmental head as large as that of a pin, provided with four suckers, but has no hooklets.

The *Taenia saginata* clings to the wall of the small intestine by means of its suckers, and abounds in those countries in which beef is the chief article of animal food. It is, therefore, the common tapeworm of the United States. Its propagation in man is dependent upon the use of raw or insufficiently cooked beef.

The *Taenia elliptica* has been found in infants and young children, but abounds in dogs and cats, the embryo being harbored in lice and fleas. The *Taenia nana* has also been repeatedly found in children.

The *Bothriocephalus latus,* or fish tapeworm, is from fifteen to twenty-seven feet long, and has a club-shaped head, without suckers or hooklets, but provided with two lateral grooves. The proglottides are broad and short. The eggs escape into the intestines from the ripe segments, and are further developed in water. They are swallowed by the pike, perch, salmon, and turbot, in the flesh and viscera of which, according to Braun, the embryos are found, and from which the mature worms have developed in dogs and cats as well as in man. It is said that in regions where improperly cured fish is eaten, especially along the Baltic and in Bavaria and Switzerland, this worm abounds. Odier states that in Geneva twenty-five per cent of the population harbors this parasite.

Etiology.—The tapeworm of man, according to the variety, is derived from raw or insufficiently cooked beef, pork, or fish. It is more frequently found in men than in women, and abounds during the middle third of life, although common among children, and Mensinga found it in an infant of ten weeks. Molsler and Peiper state that butchers, inn-keepers, waiters, cooks, and housemaids are especially apt to be affected.

Symptoms.—The parasite, according to history, may be harbored for years, especially by robust individuals, without producing any dis-

turbance, but sensitive persons, particularly women, are likely to suffer various symptoms, especially after the existence of the tapeworm has been discovered. Even before its presence is recognized, such persons may be anemic, easily tired, and subject to digestive derangements. The appetite often becomes feeble or capricious, but more frequently is excessive. Nausea, vomiting, and the regurgitation of gas and a bitter or acid fluid, occur. Attacks of colic arise without apparent cause; existing diarrhea or constipation is often attributed to the movements of the worm, which are frequently asserted to be aggravated by certain kinds of food, and assuaged by agreeable articles of diet. Women who have borne children have stated that the movements of the tapeworm in the bowels resemble those of the fœtus in the uterus.

Numerous disturbances of the nervous system are attributed to the parasite, and are regarded as of a reflex nature; such are mental and physical sluggishness, often suggesting melancholia and hypochondriasis, while vertigo, fainting, disturbances of sight and hearing, irregular pupils, hiccough, cramps, and convulsions are said to be caused by the tapeworm, and often disappear when the parasite is removed.

The *Bothriocephalus latus,* in particular, has been frequently found in persons showing a marked degree of anæmia. Palpitation, dyspnœa, loss of flesh and strength, and perhaps fever, may be so severe as to confine the patient to bed, and dropsy may be present. The resemblance of these symptoms to those of progressive pernicious anæmia is intimate, and in certain cases they are relieved by the expulsion of the parasite, while in others improvement does not follow.

The tapeworm is usually discovered by observing segments in the stools, although the segments may escape from the bowel at other times than during defecation, and then attract attention by the associated itching near the anus, or by the sensation of a smooth and slippery body upon the skin of the buttocks or thigh. They have escaped through the abdominal wall from intestinal fistulæ, have been voided with the urine in cases of vesico-intestinal fistulæ, and have been vomited. The tapeworm may exist for years, and the passage of segments be observed only at rare intervals. Their evacuation is said to be promoted by a diet containing fruit, and salted, pickled, or spiced articles of food.

Diagnosis.—The presence of tapeworm in the intestines is to be recognized only by the discovery of the segments or of the eggs, and their evacuation may be promoted by the use of a brisk cathartic.

Prognosis.—Tapeworms are rarely dangerous to their host, the beef-worm being the least harmful. The *Taenia solium,* or pork tapeworm, may become dangerous if its mature segments enter the stomach during a reversal of intestinal peristalsis, and become digested, since the embryos are then set free and may become cysticerci. The *Bothriocephalus latus* may prove a source of profound anæmia.

Treatment.—The chief drugs used against the tapeworm are

pumpkin seeds, the oleoresin of male fern, pomegranate rind and its alkaloids, pelletierine, and isopelletierine, kousso, and its active principle, tæniin or koussin, turpentine, and thymol. Whatever the drug selected, it is necessary to see that the intestinal canal is as free as may be from contents which might protect the worm. The patient should take a brisk cathartic thirty-six hours before the anthelminthic, be put on milk diet for twenty-four hours, and left entirely without food during the morning of giving the anthelminthic. We have usually employed pumpkin seed (pepo). Two ounces of it may be made up in an electuary with sugar and aromatics. Having on Sunday night taken a cathartic and on Monday no food but milk, and none of that after six o'clock in the evening, the patient should on Tuesday morning breakfast on the pumpkin seed prepared as above, with, if desired, a cup of coffee or tea. Three hours afterward he should take half an ounce of castor-oil with two drams of oil of turpentine. If the patient is feeble, the turpentine may be omitted. Purging will usually come on in two or three hours, and at this time about a quart of saturated watery solution of ordinary salt should be thrown into the large intestines to aid in the expulsion of the worm. In a robust, obstinate case, one-half to one dram of the oleoresin of fern may be taken two hours after the ingestion of the pumpkin seed, and followed in two hours by castor-oil.

Pomegranate rind is highly recommended as an efficient vermifuge; the bark that comes in small, thin quills is believed to be more active than that in larger pieces. The decoction may be made by boiling two ounces of the bruised drug, after maceration, for twenty-four hours, in two pints of water to one pint. A wine-glass of this should be taken every half hour until the whole has been taken, or until violent purging has been produced. If purging does not occur, the last dose should be followed shortly by castor-oil. The alkaloids of pomegranate are chiefly used in the form of a tannate; as put on the market by Tanret, their discoverer, each contains about five grains, one dose. The dose of pelletierine tannate, as furnished by Merck, is set down as at from eight to twenty-four grains in an ounce of water, to be followed in an hour by a brisk cathartic. Tæniin is stated by European writers to be efficient when given in doses of from twenty to forty grains, and in two hours followed by a carthartic.

Of the tænicides just mentioned, pepo, or pumpkin seed, so far as known, is harmless to man. The use of the oleoresin of male fern is reported to have caused several deaths.

Cysticercus Disease.—This affection is due to the presence in the body of the *Cysticercus cellulosae,* the larval stage of the pork tapeworm, resulting from the entrance of the ova of the *Taenia solium* into the stomach. The *Cysticerci* occur oftener in men than in women, usually in middle life. The *Cysticercus,* once lodged, usually remains fixed, although when the movements of its head have been observed

with the ophthalmoscope, it is considered that migration is possible, provided there is no mechanical obstruction. According to Dressel, the organ in which they are most often found is the brain, usually in the membranes and cortex, especially in the fissure of Sylvius. They have been observed in eighty cases by Von Graefe, and have been found in the heart, lungs, liver, kidneys, and bones.

Symptoms.—There may be numerous *Cysticerci* in the body, and no resulting disturbance be felt, or a single *Cysticercus* may rise to the severest symptoms. Invasion of the brain and cord is more likely to produce disturbance than of the skin and muscles, although in the former there may be but a single cyst and in the latter innumerable cysts may be present.

Diagnosis.—The presence of *Cysticercus* is recognized by the discovery of the parasite, when it is seen in the eye or found in a tumor removed from the skin or muscle.

Prognosis and Treatment.—*Cysticerci* may be inconvenient in the muscles or skin, but are a source of danger only when in the heart and brain. The only radical treatment is surgical. (Wood.)

ECHINOCOCCUS DISEASE, OR HYDATIDS.

The echinococcus, or hydatid, is the larva, or egg, of the *Taeni echinococcus,* a tapeworm of the dog, wolf, jackal, and fox, and is rarely found in man in this country. The disease abounds in countries in which dogs are numerous, as in Australia and Iceland.

Symptoms.—It is said that the invasion of the embryos often causes no known symptoms. When symptoms occur, they are due to the pressure of cysts upon surrounding parts, to their rupture, or to the suppuration of their capsules, and their severity varies largely with the size and seat of the cyst and the organ concerned. The large hydatid of the liver may produce but little disturbance, while a small cyst in the brain may rapidly prove fatal; cysts pressing on the spinal cord cause paralysis, and hydatid of the bone leads to a spontaneous fracture. When perforation of the capsule takes place, the contents of the cyst may escape into the alimentary canal, into the uro-genital tract, into the bronchi, or through the skin.

Suppuration of the fibrous capsule of the cyst results in the formation of abscesses, which are manifested by chills, fever, localized pain, progressive emaciation, debility, and perhaps jaundice. Death from pyemia or septicemia is the frequent result.

The general symptoms are associated with the presence of a tumor, sometimes larger than a man's head, flat on percussion, and when tangible, usually sharply defined, rounded, smooth, elastic, fluctuating, and sometimes presenting a thrill suggestive of quivering jelly. A similar sensation is sometimes obtained from ascytic fluid or from the contents of an ovarian cyst; hence this hydatid thrill is of no very special importance.

Echinococci of the nervous system produce symptoms such as are caused by similarly-located tumors; in the lungs they produce no symptoms until they attain a size sufficient to cause compression of the lungs or perforation of a bronchus, when inflammation, gangrene, and empyema may arise. When the cyst ruptures into the pleural cavity, there are sudden pain and dyspnœa, and sometimes uticaria; pleurisy is the constant outcome. Perforation of the pulmonary vessels has led to embolism and fatal hemorrhage. The growth of the pulmonary echinococcus may be manifested by cough, pain from associated pleurisy, dyspnœa, fever, and emaciation, symptoms suggestive of phthisis. When the echinococcus is in the upper lobe, there may be hæmoptysis and signs of consolidation, and yet the nutrition of the patient remain undisturbed. The absence of characteristic bacilli becomes important in differential diagnosis, although tuberculosis and echinococcus may coexist.

When echinococci develop in the pleural cavity, the symptoms resemble those of hydrothorax, and there are displacement of the heart and diaphragm and retraction of the lungs corresponding to the size of the cyst.

ECHINOCOCCUS OF THE LIVER.

When hydatids of the liver are of a size sufficient to produce symptoms, enlargement of the organ results, either local or general, and the cyst may project from the surface as a rounded tumor, or the boundaries of the liver may extend from the second rib to the crest of the ilium. A sensation of weight and pressure in the epigastrium and right hypochondrium may be present, and the upward displacement of the diaphragm may cause dislocation of the heart, compression of the lung, and dyspnœa. Pressure upon the portal veins produces ascites, while, if the hepatic vein or the inferior vena cava is compressed, œdema of the legs results.

Echinococcus of the liver is to be diagnosticated by the recognition of the enlargement, usually circumscribed, of this organ, and the determination of its cause by means of the aspirator. For a long time the strength and nutrition of the patient are well preserved; hence amyloid degeneration and cancer are easily excluded, and the persistent jaundice of hypertrophic cirrhosis is lacking. An echinococcus projecting from the upper surface of the liver may resemble a pleuritic exudation, but the highest point of dulness from the latter is in the dorsal and not in the axillary region.

ECHINOCOCCUS OF THE KIDNEY.

The parasite occurs more often in the left kidney, and its growth tends to produce a cystic tumor sometimes of large size. The general health is unaffected, and special symptoms are usually delayed until perforation of the walls of the cyst, with escape of the contents, takes

place. The physical examination of the tumor gives evidence of its cystic nature, and its renal origin is determined by its position behind the colon and by its immobility.

ECHINOCOCCI OF THE PERITONEUM.

The echinococcus may lie free in the peritoneal cavity, but it is more commonly situated in the subperitoneal tissue, especially in the omentum and mesentery and in the wall of the pelvis. Hundreds of cysts may be present, resulting in abdominal tumors of large size. The growth is gradual, and usually without symptoms, until the movements of the diaphragm are interfered with, when respiration is disturbed, or the stomach and bowels are compressed or united by adhesions, with corresponding impairment of functions.

Childbirth, we see reported, has been delayed and retention of urine produced, when echinococci were in the pelvis, while extensive suppuration and death from septicemia have followed perforation into the intestines or the vagina, although the passage of peritoneal echinococci into the hollow organs is rare. The physical examination of the enlarged abdomen is indicative of the presence of fluid, while the gradual enlargement and absence of symptoms are suggestive of the presence of an ovarian cyst.

Diagnosis.—The diagnosis ultimately depends upon the recognition of the tumor, which is of slow growth, usually painless, and generally without disturbance of nutrition.

Treatment.—Whenever the cyst becomes a source of discomfort, its treatment by aspiration or removal becomes necessary. Aspiration has been frequently followed by complete cure, but is somewhat dangerous and may prove ineffectual in retarding the growth of the cyst. Of late years cysts and complicating abscesses are being repeatedly opened, evacuated, and drained, with, as a rule, favorable results. (Wood.)

FLUKES.

Among the trematoid worms dangerous to man, of especial importance are the blood-flukes, lung-flukes, and liver-flukes.

The distoma hæmotobium, or blood-fluke, was discovered by Bilharz and Griesinger in the portal system and in the recto-vesical plexus. The eggs are present as small white specks in the liver, in the intestinal wall, and especially in the urinary tract. It is supposed to live in the waters of the Nile, and Europeans who use filtered water rarely become diseased. The presence of the parasites in the mucous membrane of the bladder and ureters causes a hemorrhagic inflammation of the mucous membrane, within and upon which the eggs are to be found, having escaped from the blood-vessels. Necrotic patches infiltrated with urinary salts are to be seen upon the surface of the membrane, and pyelitis and nephritis may be associated. Rectal and vesical tenesmus,

painful micturition, intermittent hæmaturia, increased on exertion, hypogastric tenderness, progressive anæmia, and loss of flesh and strength, result.

Diagnosis.—The diagnosis is based upon the discovery of the eggs of the parasite, which are present in large quantities, chiefly in the blood-clots and slime in the sediment of the urine of persons suffering from cystitis and hæmaturia in the regions in which the parasite are found. Medical treatment is only palliative, and consists in meeting symptoms as they arise.

ROUND AND THREAD WORMS.

Of the nematoid worms parasitic in children, one of the most common is the *ascarides lumbricoides.* These, next to the *trichocephalusdispar,* are most harmless. They resemble the earth-worm, are long, cylindrical, yellowish or reddish yellow, pointed at both ends. They are to be found in persons of all ages. The eggs are probably swallowed in drinking water. These worms live in the small intestines; their bodies are marked by four longitudinal dark bands, and are striated transversely. At the head are three rounded elevations, and between these a number of fine teeth. The length of the male is from four to seven inches, and the female from six to eleven inches.

Symptoms.—The most varied symptoms are given as due to the presence of these worms. It is true that in some children, even when worms are present in considerable numbers, no symptoms are produced. There may be vague and unpleasant sensations in the umbilical regions, which may increase to colicky pains. Sometimes there is more or less dull continuous pain, becoming at times more severe. The abdomen is often swollen, the appetite is capricious, and there may be nausea and vomiting. Mucous diarrhea is sometimes present; many of the symptoms which are much regarded by the laity, such as itching and picking at the nose, are considered by some writers of no importance. Children who are weakly, and in whom the worms are present in great numbers, may lose flesh and become pale. Various nervous symptoms, such as grinding of the teeth, unquiet sleep, disturbance of sensation, widening of the pupils, reflex convulsions, are some of the most common in young children. In the tropics the symptoms produced by worms are more severe; this is due to the enormous numbers which are present.

It is always serious when the worm ascends the intestines to the pharynx. It produces severe paroxysms of coughing, a feeling of suffocation, pain in the region of the larynx, and frequently a quickly-fatal asphyxia. If it passes the larynx and enters the trachea, the symptoms become milder. There are still violent coughing, hoarseness, or even aphonia, pain in the breast, vomiting, and convulsions. If it is not expelled by fits of coughing, death takes place in from one to three days, generally from gangrene of the lung. It is said not to be uncommon at autopsies to find a worm in the pharynx or larynx, it having crawled there after the death of the individual.

Diagnosis.—This must always be made from finding the worms or the eggs in the feces. The eggs are often present in large numbers, and can be easily recognized. In looking for the eggs it is best to give a purgative, then filter the liquid stools and examine the solid residue microscopically.

Prognosis.—The prognosis is favorable. Unless the parasites are in enormous numbers, they do not produce dangerous conditions; but there is always some danger that they will wander into some other part, produce suffocation by entering the air passages, or set up a purulent hepatitis by entering the bile-duct.

Treatment.—The remedy on which the most reliance can be placed is santonin and pepo. Santonin is almost devoid of taste and smell. It may be given mixed with a little sugar in doses of from one-fourth to one grain according to age. It is better to give it mixed with a little calomel, two hours apart, till three doses are administered.

℞ Santonin.....gr. j
Calomel.....gr. ½
Sugar.....gr. vi
M. ft. chart No. 3.

For a child of ten years the above is to be given at four, six, and eight o'clock P. M., and followed the next morning by a dose of Epsom salts or castor-oil. The dose should be repeated every ten days for two or three times, till all the eggs or young worms have been expelled.

Pumpkin seeds (pepo) are prepared in two ways; the hull is taken from the seeds, and the pulp rubbed with water to a thick mass. Of this may be given one or two ounces in a single dose. Should the worms not be expelled, the dose may be repeated several nights if necessary.

The author has had excellent results from the use of pepo prepared as follows: Beat well in a mortar one pint of pumpkin seed with the hulls on; put three pints of boiling water over the seed in a covered vessel; set it on the back of the stove, let it simmer down to one pint, strain through a cloth, and squeeze the mass to express the oil; divide the tea into three equal parts. The day previous to the treatment, the bowels should be moved with a dose of Epsom or Rochelle salts, a light supper of bread or crackers and milk be given, and no breakfast allowed till after the pumpkin-seed tea has been administered. Give the first dose at six, the next at eight, and the next at ten o'clock; at twelve o'clock give a dose of castor-oil; at two P. M. if the oil has not moved the bowels, give a dose of Epsom salts. The pumpkin-seed tea may be given every ten days for three times. The above is for an adult; a child of ten takes half, and one of five, one-third the quantity for a dose.

PIN-WORMS.

The *Oxyuria vermicularis,* known as seat-worms or pin-worms, produce very unpleasant symptoms. The male is much smaller than the female, ranging in length from one-twelfth to one-sixth of an inch; the female is from one-fourth to one-half of an inch in length.

The whole course of development takes place in the intestines. As soon as the worm is freed from its egg, it wanders into the lower portion of the intestines. Here it grows quickly, and then descends into the lower part of the small intestines, where conception is effected. The eggs are deposited in the rectum partly in the mucus and partly on the mucous membrane. The development of the worm is rapid. Leuckart and three of his scholars swallowed the eggs, and found young embryos in the stools fifteen days afterward. The worms are also propagated by self-infection. They get on the fingers or beneath the nails from the efforts which the patients make to allay the intolerable itching in the neighborhood of the anus; in this way they are often conveyed to the mouth. Children, especially, are apt to reinfect themselves in this manner.

Symptoms.—They may be present without producing any symptoms. Ordinarily they produce a chronic irritation of the rectum, with itching, burning, and pain, which extend to the external genitals. In the evening, and especially at night after the patient has become warm in bed, the worms seem to be in their most excitable condition, and cause various unpleasant symptoms. The symptoms often return each night with the utmost regularity. In children, especially, various sympathetic nervous symptoms, such as restlessness, itching of the nose, involuntary twitchings, grinding of the teeth during sleep, chorea, convulsions, and even epileptiform seizures, may result. The itching and burning of the genitals may lead in both sexes to onanism. In young female children, pruritus and leucorrhœa are sometimes seen, and in those approaching the age of puberty, various forms of hysteria. There is often a marked anemia, but instead of anorexia, there may be a ravenous appetite, especially in children. If the condition has lasted a long time, the stools are rather soft, of a fetid odor, and mixed with mucus. Not only do the worms pass out in the stools, but they also creep out spontaneously, and an investigation of the anal regions will often reveal them in the folds around the anus. In female children they may enter the vagina and here set up a purulent inflammation. Within the anus the mucous membrane is swollen, deeply injected, and covered with mucus, which is often tinged with blood.

Diagnosis.—On inspection of the anal region, the worms will often be seen, though they are sometimes so small as to easily evade observation. By washing out the rectum with cold water and examining it, they will always be found if present. The eggs may be recognized, on microscopical examination, by their long oval form.

Prognosis.—There are no really dangerous conditions produced by the *Oxyuris;* but the condition is unpleasant, and it is often difficult to remove them successfully.

Treatment.—First, give a cathartic to move the bowels; let the patient eat a light supper, take no breakfast but pumpkin-seed tea, as already prescribed for the lumbricoid worms. The next morning after taking the pumpkin-seed tea, let the patient wash out the rectum with an infusion made from quassia chips; inject about half a cup of the infusion and retain it ten or fifteen minutes, then eject it; then inject sulphur ointment with a salve injector, which can be obtained from any first-class drug store or from any surgical instrument dealer.

The quassia decoction is made by boiling two quarts of water with two ounces of quassia chips to one quart, in an earthen vessel; for a child two or three years old, two tablespoonfuls should be injected every morning, after first washing out the rectum with warm salt water; then after waiting a few minutes, inject a little of the decoction; in about an hour inject the sulphur ointment, enough to anoint the rectum thoroughly. For older children the amount of the infusion of quassia may be doubled; if it does not come away in fifteen minutes, inject a little warm salt water to remove it before using the ointment.

TRICHINAE.

This is the most dangerous of the worm parasites, although the real danger is not connected with the presence of the adult worm in the intestinal canal, but with the embryonic condition, in which the parasites invade the voluntary muscles. The embryos are frequent in the muscles of pigs; and from eating flesh containing them in an imperfectly cooked or raw condition, infection takes place in man. When introduced into the stomach, the embryos increase in size and mature in two or three days. They produce an astonishing number of young, estimated by various authors to be from two hundred to one thousand. These penetrate the mucous membrane, and in a short time find their way to the different muscles of the body.

Symptoms.—Trichinæ produce more or less gastro-intestinal catarrh; even small ulcers in the duodenum are caused by them.

There are two groups of symptoms,—those caused by the worms in the intestinal canal, and those caused by the presence of the embryos in the muscles. Those in the intestines are due principally to the perforations of the wall. When it is considered that the number of these perforations may reach into thousands, it can easily be seen that notable disturbances may be produced. These are shown by diarrhea, abdominal pains, and vomiting. There are generally loss of appetite, malaise, weakness, headache, and unquiet sleep. The secondary symptoms are intense pain and inability to move. Constitutional symptoms accompany both conditions, and often simulate those

of typhoid fever. Death takes place from exhaustion, and is often preceded by coma.

Prognosis.—The prognosis depends almost entirely upon the number of embryos which are generated in the intestinal canal. When a great number are present, the disease is almost necessarily fatal. If not fatal, the symptoms slowly subside; the worms in the muscles become encysted, and thenceforth are quiescent.

Treatment.—The only time when treatment is efficacious is when the mature worms are in the intestinal canal. Then purgatives and athelminthics are indicated. In the very beginning of the attack, emetics may do good. Afterwards, in spite of the diarrhea, purgatives should be freely given. Calomel in rather large doses should be given every three or four days, followed by full doses of castor-oil. Injections of corrosive sublimate, one to two thousand, may also be given. Benzine, given both by the mouth and as a rectal injection, has been recommended. After the worms have left the intestines, no medication directed to their destruction is of any avail, and the general condition alone can be treated. The prevention of the disease is as easy as its cure is difficult. Thorough cooking of meat, by which all parts of it are raised to the boiling point, is all that is required. Other modes of preparation of the meat, such as prolonged smoking, pickling, etc., have no effect on the parasite. (W. T. Councilman, M. D.)

CHAPTER LV.

MATERNITY.

The female organs subservient to generation are, the ovaries, the principal function of which is the secretion of the ovule, or female germ; the Fallopian tubes, designed to receive the ovule and conduct it into the cavity of the uterus; the uterus, a kind of receptacle whose office it is to contain the fecundated germ during its period of development, and to expel it immediately afterwards, and, finally, the vagina, a membranous canal extending from the neck of the uterus to the external genital parts. Most of these organs are situated within a large cavity, the walls of which are composed of bones and soft parts.

On account of the importance of the pelvis as an organ both of protection and transmission, we shall begin the study of generation with it. The pelvis is a large, irregular, bony cavity, or sort of a curved canal, which terminates the trunk inferiorly, and sustains it by its posterior part. It is placed directly upon the lower extremities, which afford it points of support, and to which, in the erect posture, it transmits the weight of the body. Its position in an adult of ordinary stature is, in general, about the central part of the whole trunk. The bones which together constitute the pelvis are the sacrum and the coccyx, both placed behind and on the median line, and the ossa-innominata bones. These last are in pairs, being situated at the sides and articulating with each other in front. The sacrum is a symmetrical, triangular bone, curved forward at its lower part, placed at the posterior part of the pelvis, where it appears like a wedge, forced in between the ossa-innominata, immediately below the vertebral column and directly above the coccyx. It is transversed longitudinally by the sacral canal (a continuation of the vertebral canal) and relatively to the axis of the body; it is directed from above downwards and from before backwards; hence, the column represented by it forms an obtuse angle with the lumbar vertebræ, being salient in front and receding behind. This point is called the promontory, or the sacro-vertebral angle. Besides this direction the sacrum is curved upon itself from behind forwards, so as to present an anterior concavity, the hollow of the sacrum.

The external organs of generation are the genital apparatus of the female, much more complicated than that of the male, and composed of organs situated in the interior of the pelvis and of parts attached to its exterior. The former are the ovaries, Fallopian tubes,

uterus, and vagina; the latter, the mons-Veneris, vulva, and perineum. (See figure 2, page 98.)

The mons-Veneris is a rounded eminence, a species of relief, situated in front of the pubis and surmounting the vulva. This eminence is partly produced by the bones and partly by the subcutaneous adipose tissue. The skin covering is very thick and elastic, but being little extensible, it can not aid in the enlargement of the vulva at the period of delivery. In the adult female, it is covered with hair and contains a great number of sebaceous follicles.

The vulva is a longitudinal opening, or fissure, situated at the median line at the base of the trunk, bounded in front by the mons-Veneris, behind by the perineum, and latterly by the external labia.

The labia majora are two cutaneous folds flattened transversely, which bound the opening of the vulva externally. The labia externa presents an external or cutaneous surface, which, after puberty, is covered with hair, and an internal one, moist, smooth, and of a rose color, which is formed by a mucous membrane having a quantity of sebaceous glands and papillæ. There is an internal labia, contracted behind, continuous with the internal face of the external labia.

The clitoris is a small, erectile, sensitive tubercle, resembling the corpus cavernosum of the male. Its free extremity appears at the front part of the vulva, about half an inch behind the anterior commissure of the labia externa, and its body is attached by two crura to ischio-pubic rami.

The urethra is situated just below the vestibule, about an inch from the clitoris, and immediately above the prominent enlargement of the anterior part of the vagina.

The hymen is the irregular opening of the vagina, and is found beneath the meatus-urinarius. This membrane is regarded as the seal of virginity.

The internal organs of generation are the vagina and the uterus, together with their appendages, the Fallopian tubes and ovaries.

The vagina (or vulvo-uterine canal) is a cylindrical, membranous tube, extending from the vulva to the uterus. It is situated in the pelvic excavation between the bladder and the rectum, extending from the vulva to the superior strait. It has the same direction as the general axis of the pelvis, that is, it forms a curve, the concavity of which is anterior. Its length varies from four and a quarter inches to five and a quarter. The length of the vagina varies in different women.

The uterus is the organ of gestation, in which the ovum is destined to remain from the period of escape from the Fallopian tube until the moment of final delivery. It is pear-shaped, flattened from before backwards, having its base turned upward, and the apex downward. It is divided into two parts, the body and neck. The body is the largest, and comprises more than half the total length; the neck is

smaller, a slight circular constriction serving to indicate externally the union of the body with the neck. The uterus is from two and a half to three inches in length. The weight at puberty is from six to ten drams; but in women who have borne children, it ranges from an ounce and a half to two ounces.

The ligaments of the uterus are the anterior and the posterior, the broad and the round, which serve to retain the organ in position and to prevent its displacement.

The Fallopian tubes are two canals, varying from four and a quarter to five inches in length, and placed in the thick, superior part of the broad ligament. They extend transversely from the lateral angles of the womb nearly to the iliac fossa on the corresponding side. Near the free extremity they spread out and become fringed, presenting what is called fimbriated extremity.

The Fallopian tubes serve the double purpose of a canal for transmitting the fecundating principle of the male, and for carrying the germ furnished by the female from the ovary to the uterus. At each menstrual period the ovule passes with the serum current along the ovarian fimbria into the Fallopian tubes.

The ovaries are analogous in the female to the testicles of the male; that is, both of them secrete a product indispensable to reproduction. Two in number, they are situated on the sides of the uterus in that portion of the broad ligament called the posterior wing, just behind the Fallopian tubes. They are maintained in position by those ligaments, and by a special one denominated the ligament of the ovary. They are situated just on the inside of the crest of the ilium, a little to the back of the uterus, and are about the size of a pecan nut.

Menstruation is a periodical flow of blood from the genital parts, having its source in the walls of the uterus. Its first appearance (which is always determined by the ovarian evolution, of which it is one of the ephiphenomena) reveals the aptitude of the female for fecundation, and constitutes one of the earliest signs of puberty or nubility. These phenomena are both local and general. The first, which is purely physical, occurs more especially in the generative organs. The pelvis increases in size in every direction, and gradually assumes the shape indicated as peculiar to the well-formed woman; the breasts rapidly develop, and the nipples become more projecting, turgescent, and sensitive; the skin surrounding the latter also becomes darker in color than before. The outlines of the body at the same time become rounded, in consequence of the greater abundance and more harmonious distribution of the cellulo-fatty tissue. The voice assumes a softer tone. Timidity and often embarrassment are shown in the presence of people with whom, but a few months previously, the young girl sported as a child. The congestion which precedes the flow is indicated by new symptoms. The young girl complains

of lassitude, of a sensation of swelling and weight in the loins, of heat in the hypogastrium and peritoneum, of a slight itching and tumefaction in the genital parts, and a painful swelling of the breast. Strange disturbances not infreqeuntly occur, and I have sometimes observed attacks of genuine hysteria. Quite frequently the first menstruation takes place without having been preceded by any of these discomforts.

Pregnancy is effected in the human species through the medium of two sexes, distinguished by the possession of different organs. The sexual character, therefore, being peculiar to distinct individuals, these evidently must first approach each other before generation can take place. This first act constitutes copulation. The consequence of the approach is an application of the fecundating principle of the male to the germ furnished by the female; in other words, conception or fecundation. The ovum, after it has been fecundated, remains, and is developed in the organs of the mother during the whole term of gestation. Lastly, at the expiration of a nearly uniform period, the new being is expelled, to maintain thenceforth a separate existence. This final act is called labor. Pregnancy is, therefore, the condition of a woman who has conceived and bears within her womb the product of conception. This state commences at the instant of fecundation and terminates with the expulsion of the body which results from that function. It continues for two hundred and seventy days, or nine lunar months.

HYGIENE AND MANAGEMENT OF PREGNANCY.

Hygiene of Pregnancy.—To be carried safely through the period of utero-gestation, the most critical time of her life, physiologically speaking, the pregnant woman needs special care. Particular attention is to be given her in the selection of diet, and in exercise, rest, sleep, clothing, and bathing. Her mental condition is to be watched; her attention diverted. The condition of the breasts calls for some prophylactic treatment.

Diet.—Very early in pregnancy the desire for food is diminished, and certain unusual articles of food may be craved. Fair quantities of food are at times partaken of, and its kind and variety are always to be considered. The morning sickness is thus sometimes best abated. In the fourth month gastric irritibility usually subsides spontaneously, the appetite reappears, and the digestion improves. All foods, animal and vegetable, that are reasonably digestible and nutritious, are best suited to her condition. In a word, the diet of a pregnant woman should be plain, simple, easy of digestion, highly nutritious, and partaken of at regular intervals. A good general supply of nitrogenous food, with vegetables and fruits, is called for. As some foods do not agree equally well with all patients, personal likes and idiosyncrasies must be consulted. A generous diet

improves hematosis, increases functional activity, augments body weight and heat, imparts tone and firmness to the blood-vessels and tissues, and diminishes the susceptibility of the nervous system to pain and reflex irritation. That the diet must directly influence the growth and development of the fœtus in the womb is reasonably clear. In the latter part of pregnancy the gravid uterus rises to and presses upon the stomach; hence, food has to be taken in greater moderation, and at shorter intervals. A milk diet is at times especially needed. Albuminuria is a condition calling for the use of milk, as recommended by Garnier. Its absolute use, strictly enforced, gives very good results in this complication.

Exercise.—Moderate exercise can almost always be well borne. Violent exercise and excessive fatigue are invariably to be avoided. Extraordinary exercise, such as riding on horseback or over rough roads, dancing, or lifting heavy weights, is injurious. Long journeys by water or by land should be postponed if possible.

Is parturition made more easy by unusual physical exercise? Affirmatory opinions have been entertained. Doubtless women whose habits have accustomed them to considerable physical exercise can, all things being equal, undergo parturition easily and quickly; but those unaccustomed to any special physical exercise should undertake only what can comfortably be borne. If active exercise is not well borne, then passive exercise may be highly beneficial. Riding in the open air gives the pregnant woman the necessary fresh air and sunlight. Crowded and ill-ventilated rooms are to be avoided. While moderate exercise is needed in many or most cases, its continuance is objectionable in cases where the normal relaxation of the pelvic joints becomes excessive. The pubic joints, most often affected, are so relaxed at times that locomotion is impeded and rest demanded.

Rest.—A pregnant woman needs an abundance of sleep, because of its health-giving, restoring influence. A portion of each day, after the midday meal, may well be selected for the assumption of the recumbent posture, to obtain for an hour or two either rest or sleep.

Clothing.—Great care is to be taken that the clothing is so adjusted as not to compress the abdomen and the chest. While the quantity and quality of the clothing are to be determined by the season of the year, the garments to be placed around the waist should be as light as is practicable and consistent with comfort. The clothing is best suspended from the shoulders. The corset and tight-fitting skirts are injurious, impeding, as they do, the expansion of the growing uterus and its contents, and favoring the development of symptoms of a not uncommon complication of pregnancy, albuminuria with uræmia. Multiparæ with relaxed abdominal walls often experience comfort from support to these parts by an abdominal bandage, thereby maintaining the uterus in a more normal position, wherein there is better

accommodation for the fœtus. All possible pressure of the pelvic and renal veins is to be avoided.

Bathing.—Baths are to be administered to the body at the usual intervals observed in health, daily in warm weather, and at least twice a week in cold weather. They are to be general, with an abundance of water and soap. The temperature of the bath may be either warm or cool, according to previous habits and to the season of the year. In the country where there are no conveniences for a body bath, a tepid sitz-bath, taken before retiring, is most beneficial. The body may be bathed with bicarbonate of soda, rubbing it on after wetting the skin, and letting it remain on a few moments before bathing. The temperature of the room should be about 80° Fahrenheit; bathe for about ten minutes, rubbing the body thoroughly all the while. The feet may be placed in a basin of tepid water while the body is being bathed; it is especially necessary to keep up the functional activity of the skin, which is often quite impeded in the last weeks of pregnancy.

Vaginal injections are required if there is leucorrhœa, vaginal or uterine. If an injection is required, there is nothing better than a saturated solution (one quart) of boric acid given with a fountain syrine in a very gentle current.

There should not be much sexual intercourse. It often becomes a source of much pelvic discomfort to a great many, and it often may create an abortion. Even uncivilized nations have condemned the privilege of sexual intercourse during the period of pregnancy, and it is said that punishment is meted out to the offenders. It is better for the husband and wife to occupy separate beds during the months of pregnancy.

Local Treatment.—Local treatment to the diseased cervix is often necessary during pregnancy. In the country it is almost impossible to have local applications applied, but it is different with our city women. Pregnancy aggravates cervical catarrh, from which come vaginitis and vulvar pruritis. The gentle use of warm vaginal injections is beneficial. Put a heaping teaspoonful of boric acid into a pint of boiling water; let it dissolve, and when cool inject slowly about a half pint while in a recumbent position; after waiting a half hour introduce into the vagina a piece of absorbent cotton dipped in sterilized linseed oil with a little turpentine added to it. (Turpentine one and a half drams; linseed oil six ounces.) Push the tampon well up against the uterus, having a string attached to the cotton, so that it can easily be removed. This treatment once or twice a day will give quick relief. Of course, when a pregnant woman can go to a doctor's office and have topical applications of astringents and emollients, and nitrate of silver in solution, aplied according to the judgment of the physician, it is much to be preferred, as this often arrests reflex disorders, such as nausea and vomiting.

Mental Hygiene.—The mental condition in pregnancy is always an important consideration. Emotional susceptibility is usually somewhat increased. The pregnant woman, quite excitable and irritable, readily responds to external influences by which, in the non-pregnant condition, she would not be influenced. Sometimes she feels unusually well, is intellectually brightened and more active, takes greater care and interest in her household affairs, and says she is positively happier. At other times a certain despondency creeps over her mental state; she is unusually morose; there is noticed irritable moodishness or peevishness beyond the control of the will; the sense of sight, hearing, smell, and taste, and the sensory or motor nerves are frequently perverted without any structural changes in the nerves concerned. It is thought that all these perversions or exaltations of function are directly or indirectly attributable to the quantitative and qualitative changes of the blood from pregnancy, and to physical changes going on in the sexual organs, creating reflex disorders. Structural alterations in the growing fœtus may be effected, modified, or perverted by psychical influences; and certain fœtal disorders may result from maternal impressions. (See article on Maternal Impressions.)

Physiologists admit, and observations prove, that the maternal emotions do affect the development of the exterior of the fœtus, and may likewise alter the mental development in its complex and delicate organization. Idiocy may so result. The mind influences and modifies the body in ways unexplained.

In view of these facts, the physician should aim to direct the mental condition of his patient; all sudden, unpleasant news, frights, and physical shocks are to be carefully avoided, and circumstances which improperly harass the pregnant woman are to be altered. Kind assurances are ever helpful. A judicious amount of amusement is not to be forgotten; the mind is to be kept pleasantly occupied, and diverted into new, pleasing, and surprising channels, into agreeable and cheerful associations. Around the patient should be thrown a gentle, protective care, and she should be shown every care and be treated with considerate kindness. It becomes the duty of the husband to give his wife an intelligent cooperation, and thus help her to bear her burden.

Management of Pregnancy.—It is the duty of every practitioner of medicine who is engaged to attend a woman in an expected parturition to give her some general hygienic directions as to diet, dress, exercise, and the regulation of her bowels and skin; the physician should also in a general way assume some professional care of her throughout her pregnancy. Many disorders and complications are liable to arise during this period, and much depends upon prompt and well-directed advice in their judicious management.

There are many women in the country who never consult a physician during their term of gestation until the time expires for the termination of pregnancy, nor even then in some cases, but they are

confined by a midwife. This article will be of use and benefit to such cases. A physician is not summoned or consulted, perhaps because there is none within reach, or it may be from lack of means, or from a motive of economy, or from ignorance, the woman thinking it is of no use, as they have heard of their mothers or grandmothers raising large families of children without calling in a physician on such occasions. Let me warn you, my countrywomen, that you are in this matter risking your life.

First of all, the stomach disorders most frequently occurring call for some attention. We have referred to dietetic management, which is more efficacious, it may be, than the medicinal treatment.

Koumiss is recommended as being good when other foods can not be retained on the stomach. It may be necessary to administer food by the rectum. For the physiological nausea and vomiting of pregnancy, the writer has found tincture of nux vomica, from one to three drops before meals in a little water, or oxalate of cerium from five to eight grains to be taken after meals in a little water, beneficial. Sodium bromide and cocaine are recommended by various writers. Electricity, the faradic current (secondary) over the stomach, applied for ten minutes (J. C. Cameron, M. D.), is also efficacious. The writer has had good results from the use of galvanism; put the positive pole over the stomach, and the negative pole in the right hand for ten minutes; move the positive pole over the dorsal spine, and the negative in the left hand for ten minutes; give from thirty to fifty milliamperes. This should be given daily if needed.

Next, the alvine evacuations are to be maintained daily. A good diet and regularity of habits show good results. Magnesia, the mineral waters, such as Congress, Hathorn, the sulpho-saline waters, or a solution of phosphate of sodium, or Carlsbad salts, or Seidlitz powders, are indicated. Purgation is seldom needed. The best laxative remedies are aloin, podophyllin, cascara sagrada, and compound licorice powder. Above all, it is important that careful attention be paid to the kidneys. "To be forewarned is to be forearmed" is well illustrated here. Albuminuria is said to be present in at least from five to ten per cent of the cases of pregnant women. Hence, the physician should make a chemical analysis and microscopical examination of the urine to detect any possible alterations in its quantity and quality.

A careful examination of the abdomen may be properly made after fœtal viability; this should be done by the family physician. The mammary glands need ample room for their development to prepare them for the coming function of lactation. The nipples, especially if retracted, should always be drawn out by the application of the index finger and thumb for a few minutes each day during the last six weeks of pregnancy.

Exposure of the breasts and nipples to the air doubtless tends to diminish their tendency to become sore and fissured. Daily ablutions with cold water are always essential. A topical application of the following as a prophylactic remedy for sore and fissured nipples is recommended, when it is thought desirable to use an astringent application:—

℞: Tannin ..... ʒj
Glycerinæ ..... ʒss
Aquæ rosæ ..... ℥ss
Mix.
Sig.: Apply daily as directed, several times.

There are no two pregnant women alike, and no absolute rule can be framed for all. The expectant treatment is generally called for. Common sense has to be the guide of many women who are unable to avail themselves of the care of a physician. Only general principles can be laid down for guidance. A very frequent danger is that an abortion, or a premature delivery, may be caused by uterine contraction; any constitutional disease, especially syphilis, may require special medication. There are remedies which often favor uterine tonicity and become prophylactics against abortion. Viburnum prunifolium, aletris, and cimicifuga doubtless favor the normal completion of gestation.

In all cases as little medicine as possible ought to be given. Pregnancy is best managed by an observance of the hygienic instructions.

THE LYING-IN ROOM.

In private practise the patient is generally confined in the room which she is to occupy during convalescence. The choice of room is important. One of the first requisites of health at all times is pure air, and this should not be denied the patient. The need of oxygen is greater than usual, owing to the severe muscular activity of labor. When possible, therefore, a commodious room, one which permits of constant ventilation, should be selected. In cold weather an open fire is an efficient aid to ventilation, and adds greatly to the cheerfulness of the lying-in chamber.

A sunny exposure is the most desirable. Dusty hangings should be removed; cleanliness is very necessary.

On no condition should confinement be conducted in an apartment recently occupied by a patient with erysipelas, child-bed fever, suppurating wounds, or other diseases which are recognized sources of possible sepsis, except after systematic cleansing and disinfection.

The Nurse's Preparations.—An orderly nurse will have ready, conveniently near the bed, a small table covered with one or two freshly-laundered towels, and be supplied with a wash basin, a hand brush, soap and hot water, an antiseptic solution, scissors, a ligature for the navel, and a suitable aseptic lubricant for the hands. The nurse

should also see that there are plenty of clean sheets and towels, one or two pieces of unbleached muslin for abdominal binders a half yard in width by one and a quarter yards in length, one or two surgically clean rubber sheets (or oilcloth, if in the country where rubber sheets are not obtainable) large enough to cover the entire width of the bed, plenty of muslin sheets, a rug or oilcloth to protect the carpet beside the bed, safety-pins of convenient size for pinning the binder, a fountain syringe, a suitable bedpan, a supply of hot and cold water, a package of salicylated or borated cotton for the navel dressing, a blanket for wrapping the child, and the child's clothing.

Preparation of the Bed.—The patient should lie upon a firm mattress. It is customary to protect the bed by means of a rubber sheet, which ought to be large enough to cover the entire width of the bed and the greater part of its length. Over this rubber covering is spread a muslin sheet, the two coverings being pinned fast to the mattress. These spreads are covered with a second rubber overlaid with a bed sheet, and two or three freshly-laundered sheets, each folded to four thicknesses, may be placed upon the bed in position to receive the discharge. The latter coverings are withdrawn after labor, leaving the bed clean and protected by the first rubber and its muslin covering. In place of the sheets for absorbent dressing, an old clean-washed bed-quilt answers every purpose; also, oilcloth will take the place of rubber when rubber sheets are unobtainable. The entire bed must be clean in the surgical sense. All rags that are used in the lying-in room should be boiled thoroughly before using them about the patient.

The Patient.—The patient should take a bath at the beginning of labor, an enema of warm water with castile soap, also a vaginal douche of a saturated solution of boric acid, one heaping teaspoonful to a quart of boiling water, cooled properly before using, and make an entire change of linen. She will usually prefer to be dressed in her night-clothing, over which, during the first stage, she may wear a loose wrapper. A napkin or a pad kept wet with Thiersch's solution, and worn over the vulva during this stage, is a simple and useful antiseptic measure.

The Obstetric Bag.—The obstetric bag should be large enough to contain all the instruments and other surgical appliances that may be needed in ordinary labor. The equipment should comprise obstetric forceps; a Davidson syringe; a glass uterine douche tube; a soft rubber catheter; a soft rubber tube, with bulb attached, for aspirating mucus from the child's throat in case of asphyxia; a half dozen needles, about two inches in length, and straight or slightly curved, for suturing the perineum; a few short curved needles, an inch and a quarter in length, for use in the vagina; a needle forceps; a knife for episiotomy; sterilized sutures of catgut, silkworm gut, and of silk; one or two hand brushes; a yard or two of plain aseptic gauze, for possible use in post-partum hemorrhage; a Sims speculum; one or two sponge-holding forceps; a Volsella; and a curette, and a catheter.

Physicians should also be provided with two or three ounces of chloroform, twice as much of ether, a few ounces of carbolic acid, a dram or two of chloral; mercurial antiseptics, and obstetric emergents, such as morphine, elaterin, digitalis, ergot, and veratrum viride, are most conveniently carried in tablet form.

ANAESTHESIA.

By "obstetric" anæsthesia is understood something entirely distinct and apart from the surgical use of anæsthetics. It is intended to diminish, not to abolish, pain. Its object is merely to mitigate the severer sufferings of ordinary labor, not to cause complete insensibility. With reference to the influence of anæsthetics upon the strength and the frequency of the uterine contractions, we have some recent observations from Donhoff.[1] He administered chloroform, in various degrees, to five parturients, studying the effect upon the pains with the aid of a tokodynamometer. Even under small doses the labor was retarded. In eight observations the muscular pressure sank nearly to one-half that present before the administration, and the strength of the uterine contractions was not fully restored for several minutes after the inhalations were stopped.

That the use of anæsthetics during labor predisposes, in some degree, to relaxation of the uterus in the third stage, as claimed by Lusk and others, is abundantly exemplified by the experience of J. C. Cameron, M. D., who states that the foregoing facts, while they do not forbid the employment of obstetric anæsthesia, call for the exercise of caution in its use. When required for no other purpose than to mitigate the sufferings of the patient, anæsthetics should be reserved until the latter part of the second stage, and even then they may be withheld so long as the pains are well borne. Their employment is permissible at an earlier period in the labor when required to subdue great nervousness and excitement or to relieve pains of extreme and unusual severity.

"In the third stage of labor the use of anæsthesia is chiefly surgical. The relative safety of obstetric anæsthesia lies not in any peculiarity of the subject, but in the mode of administration, the limited dosage, the slow and gradual inhalation, and the intermittent use of the drug, during the pains only. Under complete anæsthesia the parturient woman is exposed to the same dangers as are other patients.

"In cases in which an operation must be performed requiring anæsthetics, neither disease of the heart, of the lungs, nor of the kidneys, nor the exhaustion of the third stage of labor, forbids their use. These conditions, however, necessitate increased caution in the administration. In cardiac disease, even in lesions of the myocardium, anæsthetics lessen the danger by subduing the reflexes." (J. C. Cameron, M. D.)

[1] Archiv. fur Gyon, Band 42, 12.

Choice of Anaesthetics.—For mere obstetric analgesia, chloroform is generally preferred. It has the advantage of being pleasanter than ether, and less bulky to carry. Ether, however, seems to be growing in favor for obstetric use, and it is claimed to be no less manageable than chloroform for partial anæsthesia. Hirst thinks "analgesia is even more promptly produced by ether than by chloroform. The satisfactory use of ether for this purpose depends upon its proper administration. It must be given very gradually, in quantities of a few drops with each inspiration. The difference in the two agents is insignificant when used in the obstetric method."

J. C. Cameron, M. D., of Montreal, Canada, advises: "When insensibility is required for surgical interference, chloroform should, as a rule, give place to ether. The general mortality from the use of chloroform when pushed to the surgical degree is four or five times greater than that of ether. Of the two agents, chloroform is the more potent, and its effects persist longer after inhalation stops. Ether, since it is used in larger quantities, is more irritant to the air passages than is chloroform; hence, ether should be replaced by chloroform in inflammation of the air passages, especially if it be acute. The patient is prepared for anæsthesia by loosening the clothing, by lowering the head, and such other precautions as are commonly observed in physical practise. To protect the skin from irritating effects of the chloroform vapor, the lips, nose, and chin should be smeared with vaseline or with glycerine. A towel spread in one thickness over the head, and lifted at the middle so as to form a large cone-shaped air-chamber about the face, makes a suitable inhaler. A folded handkerchief may be laid over the eyes for protection from being burned.

"On the first premonition of a coming pain, the inhaler is placed over the face of the patient, and the anæsthetic is dropped upon it opposite the mouth. With chloroform, one drop, or at the most two drops, should be allowed to fall at each breath. In case ether is used, three or four drops with each inspiration will suffice. When sufficient effect is not obtained in this manner, the patient may be required to breathe rapidly as the pain is coming on.

"For convenience in graduating the administration, a bottle specially constructed for the purpose may be used, or a dropping bottle may be improvised by cutting a longitudinal slit in the side of the stopper.

"The foregoing methods of administration insure an abundant dilution of the anæsthetic vapor with air, and a safe and gradual development of anæsthesia with the least possible quantity of the drug. The inhaler should be removed on the approach of unconsciousness, and should always be withheld in the intervals between the pains. During the severer pains at the acme of expulsion, the inhalation may usually be pushed nearly or quite to the surgical degree."

Other Anaesthetic Agents.—An agent of great value as a partial substitute for the anæsthetic vapors is chloral. It is particularly useful for alleviating the pains of the first stage when they are not well borne. From forty-five to sixty grains may be given in doses of from ten to fifteen grains, repeated every half hour. The total quantity should not exceed a dram (sixty grains). Under the full dose the patient usually bears the pains with but little complaint, and sleeps quietly in the intervals. Chloral, in the quantity mentioned, has no inhibitory effect upon the uterine contractions. In disease of the heart, either organic or functional, the wisdom of its employment is questionable, owing to its depressant effects. It is said by some authorities to be unsafe to give chloroform to a patient who is already under the influence of chloral. From an eighth to a quarter grain of the sulphate of morphine, administered hypodermically, as a rule acts kindly in unusually painful labor, but it is rarely to be recommended in strictly normal conditions.

Examination During Labor.—On reaching the patient, in response to her summons, the first duty of an obstetrician is to see if labor has actually begun. But first the hands must be made clean and antiseptic; good, old lye soap, such as will be found in the country, answers the purpose for cleansing the arms and hands. The beginning pains are not always to be taken as evidence that active labor is near at hand. Painful uterine contractions are sometimes experienced at intervals for days before the birth. Rarely after they are fully established they may wholly cease for an hour.

Inquiry should be made for the usual phenomena of beginning of labor, the time when the pains began, their character, strength, and frequency. The first uterine contraction of childbirth frequently gives rise to little more than a sense of pressure in the sacral and lumbar region. As the labor progresses, the effects are felt in front over the lower abdomen and finally down over the thighs. If the labor is in actual progress, a systemic external and internal examination is to be made. Examination of the abdomen will determine whether the child is living, what is the presentation and position, the quality and frequency of the fœtal pulse, how far the head has descended in the pelvis, and the presence of anything that may complicate the birth. The relative size of the head and pelvis may be estimated by observing how far the head has sunk, or can be made to sink, into the excavation. The character of the fœtal heart-sounds affords important information as to the prognosis for the child, and they should be listened to frequently throughout labor.

A fœtal pulse rate much above or below the normal range, or a pulse which grows progressively weaker, indicates danger to the child.

Before examining internally, the nurse should be directed to clean the abdomen, the vulva, and the inner surfaces of the thighs with soap and water, and finally with an antiseptic solution. From

this examination the obstetrician learns, first, the condition of the vulva and the degree of resistance it will be likely to offer as the head descends; second, whether the vagina is well lubricated by the secretions, and the presence or absence of obstructions; third, the condition of the cervix, how far dilated, and whether dilatable as judged by the extent of softening and thinning; fourth, the size and protrusion of the bag of water; fifth, the presentation and position of the child in confirmation of the abdominal examination.

Vertex presentations are recognized by the hardness and the globular shape of the cranial portion of the head and by tracing the sutures and fontanels. The examination must be made with care, using firm pressure, and searching as far as the fingers can reach, as the anatomical character of presenting parts is often somewhat obscured by the caput succedaneum. In other than vertex presentations, still greater pains will generally be needed to identify the presenting part. The position is determined by finding in which quadrant of the pelvis the small fontanels lie. This is best located by first tracing the sagittal suture.

The examiner will learn whether the membranes are still intact, and how far they protrude during a pain, and will make sure that a loop of the cord has not prolapsed into the bag of water. In this part of the examination care will be needed, lest the membranes be prematurely ruptured.

A question which is invariably asked is, "How long will the labor last?" A definite answer is seldom possible at the beginning of labor. The prognosis, so far as it can be estimated, must be based on the strength and frequency of the pains, the extent of dilatation and the dilatability of the cervix, the position, size, and hardness of the head, and the degree of descent. When nothing abnormal has been discovered, assurance should be given accordingly.

Management of the First Stage of Labor.—During the first stage of labor the patient ought not, as a rule, to be confined to the bed until dilatation is well advanced. She is usually more comfortable if allowed the liberty of the room, and the pains are thereby promoted. Much walking is not advisable, however, before the head has engaged; it may cause prolapse of the cord or the small parts, and may hinder engagement. If the membranes rupture, or if the pain assumes unusual intensity, the patient must be kept in a reclining posture upon the bed or a lounge. Malpositions are often capable of correction by the woman's being required to lie upon the side toward which that part of the head points that is to lead the descent.

For example, in a right occipito-posterior position, the patient should lie on the right side, and in a left posterior position of the occiput, upon the left side. The clothing should be loose, and limited to a wrapper and the underclothing.

During this stage, place hot antiseptic cloths, steamed or wrung out of boiling water, over the symphysis pubis down over the vulva, and a hot bottle of water against the compress, and change when needed. A little carbolic acid added to the water is advisable for asepsis. This affords comfort in the first stage of labor. If the obstetrician has, in the first examination, become satisfied of the absence of complications, the vaginal examination will rarely need to be repeated until the rupture of the membranes. When the protruding bag breaks before the head is engaged, it is well to make sure that a loop of the cord has not been swept down with the gush of water.

The physician's first visit should be prolonged sufficiently to form some estimate of the probable rapidity of the labor and of the length of time before his attendance will be required. On departing, all needed instructions should be left with the nurse. The patient is to be allowed such food and drink as may be necessary, to be warned against voluntary expulsive efforts, and usually to remain off bed until the pains are severe The lower bowel should be cleared with an enema of warm soap-suds, and the bladder frequently evacuated.

It is better for the obstetrician not to remain with the patient until the os has reached the size of a silver dollar, even after his or her continuous presence at the house is required, and not then in most cases, except when attentions are needed by the patient. I have heard women say the approach of a doctor would check their labor pains.

Throughout the labor idle bystanders should, as a rule, be excluded from the lying-in chamber. The presence of the husband is a matter to be left to himself and the patient. Both the mother's and the fœtal pulse should occasionally be counted.

All manifestations within the passages for the purpose of accelerating the labor in normal cases are to be scrupulously avoided. When the anterior lip of the cervix is caught over the occiput, and apparently retards the progress of the labor, it may be hooked forward during a pain until it retracts above the head. This is rarely necessary, and is very liable to abuse.

Management of the Second Stage.—In the second stage of labor, as in the first, so long as all is normal, the duties of the obstetrician are few and simple. From the time dilatation is nearly complete, the patient must not, as a rule, be allowed to leave her bed. She may use a bed-pan for the evacuation of the bowels, and may have to use a catheter to void the bladder. The catheter must be aseptic, and the vulva washed with hot carbolized water before introducing it. She is to be dressed in the usual night-clothing, and the nurse may now turn up the hem of the gown, and pin it to the yoke with two safety-pins, and pin a folded sheet around the waist in front and over the thighs and knees for a covering. When the pains are feeble, their intensity may be increased by requiring the patient to move about in the bed, or even to assume for a time a sitting or half-sitting posture. The uterine

expulsive efforts should be reinforced by the voluntary muscles. The patient may be directed to "hold the breath and bear down with the pains."

Most women, during expulsive pains, instinctively brace their feet and catch the hands of the nearest bystander to assist the straining effort by pulling. Except in precipitate labor, this practise is to be encouraged. A sheet rolled into a loose rope and fastened by one end to the foot of the bed makes a convenient and efficient sling for the purpose. An abdominal binder is frequently useful in helping the progress of labor during the second stage, particularly in multiparæ having lax abdominal walls.

The distressing sacral pains so common in the expulsive stage of labor may be relieved in some degree by pressure or rubbing hard over the painful region. For this purpose the nurse, taking position on the bed behind the patient as she lies upon the side, supports the back by pressing firmly against the sacrum with the palm of the hands during the pains. Cramps in the lower limbs are best overcome by powerfully contracting the antagonistic muscles. In case of cramps in the calf of the leg, for example, the patient should forcibly flex the foot and hold it so until the muscular spasm subsides.

RUPTURE OF THE MEMBRANES.

When the bag of membranes does not burst spontaneously by the time it reaches the pelvic floor, it should be ruptured by the obstetrician. Care must first be taken to see that a loop of the cord has not slipped down beside the head, as that condition of things would be seriously complicated by the escape of the water. It is not usually difficult to tear the sac with the finger-nail during a pain. Failing by this method, sharp-pointed scissors, previously sterilized, may be used. A convenient instrument is a sterilized coarse hairpin. It is first straightened, and then held over a flame. This perforator is passed on the finger-tip as a guard and guide, and the bag of membrane is punctured while tense during a pain.

Obstetric Position.—As a rule, the posture of the patient should be largely left to her own choice. Occasional changes relieve fatigue. In simple slow labor, the pains are hastened by permitting her to move about in bed, and now and then take a sitting posture; until the head reaches the pelvic floor a half-sitting posture is most favorable, since the propelling force thus acts most effectively in the line of descent. At the perineal stage, the lateral position, with the body flexed, which position is most advantageous for the obstetrician, is at the same time advisable from the standpoint of mechanism. A blanket made into a roll and placed between the knees, or a pillow doubled, answers well for the comfort of the patient while in the lateral position. The lower end of the sacrum is tilted backwards, and some advantage, perhaps, may be derived from the fact that gravity acts more nearly in the axis of

expulson. All that the obstetrician needs to know in normal cases can usually be learned by abdominal palpation and auscultation. The descent of the head may be followed by palpating over the lower abdomen until the occiput has reached the floor of the pelvis. From that time the progress of descent may be noted by the touch through the pelvic floor, and during the last moments of expulsion by ocular inspection. Frequent vaginal examinations expose the patient to possible infection in spite of due care in the way of asepsis. A bowl of boiling water should be conveniently placed with carbolic acid or some kind of antiseptic added to the water, and each time the obstetrician has to examine the patient during the process of labor, the hands should be washed. Have plenty of fresh-laundered towels at hand, which have been sterilized for the obstetrician's use.

Prevention of Injuries to the Pelvic Floor.—In strictly normal conditions, muscular structures of the pelvic floor slowly relax under the pressure of the gradually-advancing head, and escape intact. The fourchette, however, is frequently torn in first births. In cases of relatively small vulvo-vaginal outlet, and in rigidity of the structures from whatever cause, the parts will generally be lacerated during the expulsion of the head in spite of the most skilful efforts on the part of the obstetrician.

The order in which the tissues give way is fascia, muscle, mucous membrane, and skin. Accordingly, a laceration may occur subcutaneously, the tear being confined to the muscle and fascia, and no breach of continuity appearing to the eye. As the cause of the tear is undue strain upon the resisting girdle through which the head passes at the moment of expulsion, it is plain that any measure, to be of value in preventing the injuries in question, must do one or both of two things: It must act to promote the relaxation and distensibility of the pelvic floor, or to lessen the tension to which it is subjected during the birth, or both. The former object is best accomplished by the slow and gradual delivery of the head, permitting time for the tissues to stretch; the latter, by so regulating the head as to keep its smallest circumference in the grasp of the resisting girdle and the propelling power directed in the axis of the outlet. The rate of descent is perfectly at command of the obstetrician. The expulsive force of the abdominal muscles may sometimes be suspended by requiring the patient to breathe rapidly during the pains. This, however, is not always possible. The action of the abdominal muscles is at this stage frequently involuntary, and wholly beyond the control of the patient. Most effectual for the regulation of the expelling powers is the use of anæsthetics. Chloroform or ether should be given at this period on the appearance of the slightest danger of laceration. By the judicious use of the anæsthetics, the strength and frequency of the pains and the rapidity of expulsion may be regulated at will. The advance of the head, however, can still further be controlled by pressure with the thumb and finger held con-

stantly upon the occiput. With the thumb applied to the head immediately in front of the tense border of the perineum, and with two fingers resting upon the occiput, the rate of descent is easily watched and regulated.

To keep the tension of the vulva at a minimum, the long axis of the cephalic cylinder must be kept at right angles with the plane of the outlet of the softer parts. Too rapid extension of the head must be prevented. The forehead should not be permitted to pass the perineum until the occiput is fully expelled and the nape of the neck rests in the subpubic arch. Moreover, to guard against too great strain upon the pelvic floor, the direction of expulsion must be regulated by crowding the head well up in the pubic arch, especially at the time when the equator of the head passes the vulvar ring. The expelling force is thus directed in the axis of the outlet, and the least possible downward thrust is exerted upon the pelvic floor.

The foregoing manipulations are best conducted with the patient in the left lateral position. In first labors, therefore, and in others in which the perineum is liable to be torn, the patient should, as a rule, be placed upon the left side, with the buttocks close to the edge of the bed, and a pillow doubled placed between the knees, as soon as the head has reached the floor of the pelvis. There is rarely danger of laceration until after the occipital pole appears in the vulvar fissure. Usually up to this point the progress of the perineal stage, when not over-rapid, may be noted by touch alone. With the finger upon the perineum just behind the posterior vulvar commissure, the occiput can be felt through the soft parts some time before it begins to distend the perineum, and the rate of descent can be observed as accurately as by passing the finger within the passages.

From the moment the occiput appears in the vulvar orifice, the soft parts ought to be under ocular inspection. The vaginal discharges are occasionally washed away with a cloth which is kept lying in a warm antiseptic solution. The tension of the resisting ring may be tested by now and then passing the finger within the vaginal orifice during the pain.

The head is allowed to advance until the perineal edge becomes as tense as is deemed safe. Its further progress is then arrested by direct pressure with the fingers in the line of descent. Until about to be expelled, it is driven down with the pains, and recedes in the intervals; by this to-and-fro movement the pelvic floor is moulded, as it were, to the required degree of distention.

When the bregma appears at the edge of the perineum, the head no longer recedes between the pains, and is on the verge of expulsion. During the passage of the equator of the head, extension must be prevented by upward pressure in the axis of expulsion with the thumb placed upon the sinciput close to the perineum, the fingers resting upon the occiput. The sinciput must not be permitted to advance faster

than the occiput. If required for better control, both hands may be used.

A favorite method for managing the expulsion of the head is the following: The patient lying upon the left side close to the edge of the bed, the operator, sitting behind her, grasps the head with the fingers of the right hand placed just in front of the fourchette, while the left hand, passed over the abdomen and between the thighs of the mother, seizes the occiput. This procedure gives easy command of the birth of the head, yet offers no important advantage over simpler methods. As a rule, in first labors, a half hour or more will be required from the time the pelvic floor begins to be distended until the head can safely be allowed to pass. In subsequent births a shorter time will usually suffice.

There is no objection to the use of gentle pressure upon the head through the lateral aspects of the pelvic floor. For this purpose, the hand may be laid flat upon the bulging soft parts, with the thumb extending along the right and the fingers parallel with the left labium. The hand should rest lightly upon the median-line thinned-out portion of the perineum, the pressure being applied mainly to each side of it. It must be borne in mind, however, that the object is to regulate the expulsion of the head rather than to support the perineum. Much compression of the tense pelvic floor, especially its thinned-out median portion, between the child's head and the obstetrician's hand, must tend rather to increase than diminish the danger of rupture. If the patient lies upon the back during the perineal stage, it will be found more convenient to regulate the expulsion by the thumb placed upon the occiput and the first two fingers upon the head in front of the frenulum. The introduction of the fingers into the rectum for the purpose of shelling out the head, even when practised between the pains, is more likely to cause than to prevent laceration by too precipitate delivery." (J. C. Cameron, M. D.)

Episiotomy.—It is said that no one method yields better results in preserving the integrity of the perineum than episiotomy, rightly timed and properly executed. The ultimate condition of the pelvic floor after episiotomy correctly performed, is even better than after many natural deliveries in which the parts escape rupture. It should be skilfully performed. The incision should be closed after labor, with a running or an interrupted suture with fine catgut. The wound may generally be closed without waiting for the delivery of the placenta, thus avoiding the necessity of renewing the anæsthesia. During the suturing, the patient may lie on the back, or on the side opposite the one being repaired.

Management of the Cord.—The moment the head is born, a finger is slipped within the passages to ascertain if the cord is coiled about the child's neck. When so found, the loop or loops should be drawn down one by one over the head. Should the cord be so taut that it

can not be brought down,—an accident that must be extremely rare,—the cord may be tied at two points, and be cut between the two ligatures, and the trunk promptly delivered.

Delivery of the Trunk.—The head should now be held in the hand to keep it in the axis of expulsion. While the anterior shoulder lies behind the symphysis, the finger is passed over the dorsal aspect of the posterior shoulder and is slipped into the axilla. Some operators deliver the anterior shoulder first according to the usual teachings. Having now passed the finger into the axilla, the posterior shoulder is then folded forward, and is cautiously lifted over the perineum.

Except in emergency, calling for immediate delivery in the interest of mother or child, the expulsion of the trunk is left to nature. It is not a good practise to drag the child out of the uterus. The uterus should be compelled to expel it. The presence of the trunk and the extremities stimulates contractions, and time is permitted for retraction. When necessary, the expulsion of the trunk may be hastened by the use of friction over the uterus.

On the expulsion of the head, the face should be bathed, and the skin about the eyes should be carefully cleansed and thoroughly dried as a preventive against ophthalmia. Mucus in the pharynx should quickly be removed by the finger covered with a piece of soft wet muslin, or by the use of a soft rubber tube with an aspirating bulb attached.

Ligation of the Cord.—The time for tying the cord is by no means a matter of indifference. Systematic observations have shown that a child gains from one to three ounces of blood by delaying the ligation of the cord for several minutes after birth; that in reported cases thus treated, the children are notably more robust than when immediate ligation has been practised, and that the usual loss of weight during the first few days of infancy is diminished.

"This post-natal transfusion of blood is a fact of no little importance, especially in prematurely-born and anæmic or puny children. According to Budin and Ridemont,' it is mainly the result of thoracic aspiration. Schucking, Porak, and Fritsch, however, attribute it chiefly to the pressure exerted upon the placenta by the uterine contraction and retraction."

Since the child's heart may be endangered by forcing too much blood into the circulation, compression of the uterus should not be practised before the cord is tied.

In certain emergencies, ligation may be necessary, owing to the mother's requiring the obstetrician's entire attention. In cases of well-developed, vigorous infants, the rule of late ligation is not of so much importance. The usual practise now is to tie the cord after notable pulsation has ceased, and the respiration is fully established.

In case of twins, the cord should always be ligated on the maternal as well as on the fœtal side, owing to the possibility of a vascular connection between the placentas. A suitable material for the ligature is a

narrow linen tape or surgeon's plaited silk ligature. The ligature should be dropped in an antiseptic ready for use. The common practise is to tie from one and a half to three inches away from the umbilicus. The ligature should, therefore, generally be placed not more than an inch to a half inch from the cutaneous line. It is to be tied as tightly as it can be drawn, with care to put no strain on the umbilical insertion. Before tying, the cord, unless it is already thin, should be pinched firmly between the thumb and finger at the point to be ligated. This procedure is considered better than stripping the cord to thin it before ligating, which is more liable to do violence to the navel.

The cord is divided within a quarter inch of the ligature. It is cut with clean antiseptic scissors while held in the hollow of the hand to guard against injuring the child. A bit of cheese-cloth or absorbent cotton pressed a few times against the cut end of the stump will show whether the vessels are securely tied. It is a common practise to place a second ligature a short distance from the first to control the maternal end of the cord. This promotes cleanliness, and, it is generally believed, favors the plancental expulsion.

Management of the Third Stage.—Upon the skill and attention given to this period, the immediate safety of the mother and the rapidity and completeness of her recovery will often in great measure depend. The chief dangers of this stage are those which grow out of a relaxed condition of the uterus,—hemorrhage, embolism, and the retention of clots favoring sepsis and subinvolution.

The management of the third stage is, therefore, mainly addressed to uterine contraction and retraction.

From the moment the head is born, the uterus should be constantly watched, with the hand held flat upon the abdomen over the fundus, until evacuation is complete and the uterine globe as hard as a hand-ball. After the expulsion of the child, the patient is placed upon her back. The nurse, if she is competent, may be trusted to hold the fundus, at least while the physician is occupied with other duties. The hand is to be held quietly upon the abdomen so long as the uterus retains its normal consistence. Should the contractions be feeble, they may be stimulated by gentle friction. This friction is best practised by moving the lax abdominal walls over the uterus with a circular motion of the hand. More active interference is seldom required in normal cases. Marked flabbiness of the uterus and indistinctness of outline call for more energetic measures to produce contraction.

When the placenta is not expelled after a reasonable time, resort should be had to the method of Crede, as follows: A half hour after the termination of the second stage of labor is allowed for the detachment of the afterbirth. If, at the expiration of that time, the placenta is still undelivered, friction is applied to the uterus until a vigorous contraction is induced. The hand is then placed in such posi-

tion upon the abdomen that the fundus rests in the hollow of the hand with the thumb in front and the four fingers behind.

At the height of the contraction the uterus is compressed and thrust downward in the direction of the pelvic axis. If not at once successful, the process is repeated at short intervals until the object is gained.

Until recently Crede advocated much earlier interference. Shortly before his death he recommended waiting thirty minutes. His procedure is now generally adopted.

Traction upon the cord while the afterbirth lies in the upper uterine segment is considered inconsistent with the normal mechanism of placental expulsion. When the placenta has passed into the lower segment of the uterus or the vagina, no harm will be done by gently pulling the cord to assist the delivery.

As the placenta is extended, the membranes are gradually detached from the uterus, care being taken that no fragments are torn off and left behind. To prevent this, the placenta is caught in the hand as soon as it passes the vulva; and if the membranes are not already free, they should be twisted into a rope by turning the placenta over, and the twisting continued until the separation is complete.

Should a strip of membrane accidentally be left in the passages, it may be removed, if in the vagina or hanging from the cervix, by grasping it with the fingers and gently drawing it away, or by seizing it with sterilized catch-forceps and twisting it off. Fragments of membrane remaining in the uterine cavity above the cervix are, as a rule, better left to be expelled with the lochial discharge, unless they give rise to hemorrhage. Placenta and membrane must be examined carefully to see if they are complete. To make sure that both amnion and chorion are entire, the membranes are best examined by transmitted light.

The third stage of labor is not complete until uterine retraction is fully established. For at least half an hour after the placenta comes away, the uterus is to be watched with the hand upon the abdomen, using friction if necessary to provoke contraction. It is a useful precaution to give a half dram of the fluid of ergot at the close of labor, if the uterus is not firmly contracted. Its use is proper only after the evacuation of placenta, membranes, and clots. Its action is most prompt and certain when injected hypodermically. One or two doses may be left with the patient, with instructions that they be taken in the event of flowing too freely. The use of a moderate dose of ergot at the close of labor is not only harmless, but is entirely in keeping with the object of treatment at this period. It limits the danger of hemorrhage, and by diminishing the blood supply, promotes involution. It closes the gates against infection, guards against the retention of blood clots in the uterine cavity, and therefore lessens

the tendency to after-pains and to putrid accumulations in the uterus.

Cervical lacerations should be sutured at the close of labor in case they give rise to much hemorrhage. In the absence of troublesome bleeding, the advantage of primary suture is thought to be doubtful.

Lacerations of the pelvic floor, lacerated perineum, should be repaired as soon as the condition of the patient will admit. Lacerations of the pelvic floor should be immediately sutured. Perfect union may be obtained by operating at any time within twenty-four hours.

Toilet of the Patient.—The child is received in two or three thicknesses of flannel previously warmed, is well wrapped, and laid in a warm place, the nurse then turning her attention to the mother. Soiled portions of her body are to be cleansed, best with an antiseptic solution; her linen, if necessary, is changed; all blood-stained articles removed from the bed. For bathing the genitals, a piece of freshly-boiled cheese-cloth is to be used instead of a sponge.

Vulvar Dressing.—After cleansing, the vulva is covered with an aseptic dressing. A fresh-laundered napkin is suitable, or a lochial guard of absorbent-cotton waste, or of cheese-cloth specially made for the purpose, may be employed. These dressings are best sterilized by steaming immediately before using. Flowing steam is most effective. The object is to promote the cleanliness of the external parts, thus limiting the danger of infecting the passages from the decomposing discharges. The use of some non-irritant antiseptic, like boric acid or bismuth powder, helps to retard putrefactive changes. One rubber sheet should be left in place under the sheet for four or five days. A draw-sheet placed under the hips of the patient is a convenient dressing for protecting the bed. A common muslin sheet folded four or five times answers for a draw-sheet, and should be replaced by a fresh one as often as soiled.

Abdominal Binder.—This is useful to steady the uterus and promote the comfort of the patient, especially when the abdominal walls are very lax. The usual material is a piece of domestic or unbleached muslin, one and one-half yards in length and about eighteen inches in width; this gives width enough to reach from the ensiform to a point below the trochanters. Unless the binder overreaches these bony prominences it is liable to slip up, and in a few hours is a mere rope around the body. Binders ready made with gores to fit the body offer no advantage. The pinning of the binder should begin at the lower border, and at the first application should be fairly tight. If the uterus shows a tendency to relax, three folded towels, used as compresses, may be placed on the abdomen under the bandage, one on either side of the uterus and one immediately above it. The binder may be dispensed with after one or two weeks. An antiseptic vaginal douche may be administered by the nurse the next day after labor, care being used in giving it; in passing the vaginal

tube it should be kept close to the vaginal wall anteriorly all the while the douche is being given to prevent any of the water from passing into the uterus; a teaspoonful of boric acid put into one quart of boiling water and allowed to cool to the proper temperature (100° Fahrenheit) may be administered daily. Every housekeeper should have a hospital bed-pan, a convenience seldom seen in this country.

Asepsis.—Most important is rigid cleanliness of the external genitals of the patient, her linen, and bed-linen. The vulvar dressing should be changed every three to six hours during the first two or three days, and at all times as often as it becomes soiled. Each time the dressing is renewed, the external genitals and their immediate surroundings are to be carefully cleansed with soap and water, and finally washed with an antiseptic solution. A convenient method of cleansing the vulva is by irrigation with a fountain syringe, the stream being projected against the parts to be cleansed, and its action assisted by gentle friction with an aseptic cloth. A bed-pan in position beneath the buttocks receives the washings. If any fetor is perceptible, it must, as a rule, be assumed that the toilet of the patient has not been properly cared for. If the discharges become fetid, notwithstanding proper external precautions, an antiseptic vaginal douche should be given two or three times daily, or often enough to suppress all pubic odor. The douche tube, sterilized by boiling, is introduced for only one or two inches, with care to avoid abrading the mucous surfaces. Carbolic acid, a teaspoonful to one quart of boiled water, or a 15-volume solution of hydrogen dioxide, in full strength or diluted with three or four volumes of water, may be employed. Linen should be changed as soon as soiled.

After-pains.—These, if severe enough to deprive the patient of sleep, or to be exhausting, must be relieved.. A grain or two of opium or one-fourth of a grain of morphine may be given; gum-camphor about the size of a small pea will usually relieve the pains, and may be given when necessary, though not oftener than every two or three hours; one-half of a grain of codine is also valuable for this purpose. Some writers recommend chloral hydrate in doses of from twenty to thirty grains, well diluted in water or milk, as effective for relieving after-pains. The coal-tar analgetics are effective, but when repeated are open to objections, as they lessen the strength of the uterine contractions, and consequently retard involution.

The lying-in woman perspires frequently and actively; hence her skin ought to be bathed often with tepid water, or sponged with water and alcohol, equal parts. This bath should be followed by a gentle rubbing with a warm towel until the body is in a warm glow. Cleanliness of the bed is aided by the frequent changing of the draw-sheets, which are placed under the hips of the patient.

Posture.—During the first few hours after labor, the patient should lie on the back; a small pillow may be placed under the

knees to afford comfort. After the uterus has become permanently retracted, and the vessels at the placental site are firmly closed by thrombi, the patient may lie on the right or left side.

Rest.—A sound sleep of several hours after delivery is a favorable prognostic. It not only speaks well for the condition of the patient, but is a potent restorer. Care should be taken, therefore, to procure rest and sleep as soon as possible after the necessary attentions to the mother and child have been completed. The room should be quiet, and the light subdued by drawing the curtains. It is especially important that the child does not disturb the mother's rest; it ought not to sleep in the same bed with the mother; and if it cries, it should be removed to another room.

It is the duty of the physician to make a systematic examination of both mother and child at each visit. The principal points to be observed during the first days after delivery are the general appearance of the woman, whether she has rested sufficiently; what amount of nourishment she has taken, and what kind; the amount and character of the flow; whether the bladder has been emptied, and the quantity of urine passed; if the bowels move daily after the first twenty-four hours; the presence or absence of after-pains and their severity. The pulse and temperature are to be noted. The binder should be loosened at each visit, and the uterus examined through the suprapubic region to learn whether the bladder is disturbed. The urinary secretions as a rule are greatly increased during the first few hours after delivery, and injurious distention of the bladder frequently results. The condition of the breasts and nipples and the amount of milk secreted should be watched, especially during the first week. Daily inquiry should be made with reference to the child, whether it nurses properly and shows signs of thriving; the condition of the eyes, mouth, skin, the stump of the navel cord, and whether the bladder and bowels are properly evacuated. It is well for the first few days to know the rectal temperature, which the nurse should be instructed to take two or three times daily, and record on suitable blanks. This is important during the first week. After that time, if all is normal, a simpler record will suffice.

Ventilation.—The atmosphere of the lying-in room must be as nearly pure as possible. Air should be admitted freely by open windows, as much as is consistent with a proper temperature of the apartment. As the air is constantly vitiated, so the ventilation, to be effective, must be continuous. The sunlight may be admitted, but the eyes of the infant must be protected.

Diet.—The diet for the first twenty-four hours is to be restricted, as a rule, to liquids. After the use of anæsthetics no nourishment will be borne until the patient has recovered from their effect. The constant inhalation of good apple vinegar will very quickly relieve the sickness caused by the anæsthetic; it must be inhaled as long as

the breath gives off the odor of the anæsthetic. It may be administered by saturating a thick cloth with the vinegar and laying it on a piece of oilcloth, or rubber, or thick paper over the chest, or have the attendant hold it over her nose at first till relieved; then lay it on the chest, where it can be steadily inhaled. The writer knows by experience that apple vinegar, constantly inhaled, will relieve the nausea from an anæsthetic. As soon as nausea is relieved, a little nourishment may be given. Warm liquid, such as clear soup, bouillon, gruel, cocoa, or a cup of hot tea, may be allowed directly after the close of labor, if no nausea is present. On the second day, soft-boiled eggs, boiled custard, panadas, and similar easily-digested foods are suitable. From this time on a moderately full diet is allowed. The dietary, however, must be varied to suit the individual case. As liberal a diet as the patient can digest is essential to the normal progress of the milk secretions.

Retention of Urine.—The patient must be warned of the importance of passing her urine within six or eight hours following the close of labor, and at similar intervals thereafter. The enfeebled control over the bladder in the first hours after delivery frequently leads to retention of urine. This is especially liable to occur from reflex disturbance, when the perineum has been sutured. Warm fomentations over the meatus-urethra, the sound of running water, and moderate pressure applied with the hand over the pubic region, are useful aids in voiding the bladder. The catheter should be withheld, to be used as a last resort, owing to danger of setting up a more or less intense catarrh of the vesical neck from infectious material carried on the instrument.

Use of the Catheter.—When catheterization is unavoidable, every precaution must be observed to prevent infection of the bladder. The soft rubber instrument is the easiest and most desirable for catheterization. Boiling the catheter a few minutes before using renders it antiseptic. Cleanse the genitals by washing with carbolized water, before using the catheter, which should be oiled with sterilized oil or vaseline. The labia should be held well apart, either by the patient or an assistant, so as to expose the meatus. The catheter should be warmed, and then passed in gently, only far enough to enter the bladder, until the urine begins to flow. Pinching the catheter firmly till it is withdrawn will prevent the urine from dripping when it is removed. The parts are cleansed with an antiseptic wash. If by accident the instrument becomes soiled through the process, it should be washed and then boiled in a little soda solution before being laid away.

Evacuation of the Bowels.—The bowels should be evacuated not later than twenty-four or thirty-six hours after labor. A mild saline laxative, citrate of magnesium, or compound licorice, is also recommended. The action of the bowels may be assisted with warm water

and castile soap, or with a dessert-spoonful of glycerine in a pint of warm water. Epsom and Rochelle salts, equal parts, a tablespoonful in a half glass of water before breakfast, is also a good laxative.

Lactation.—The mother should, if possible, nurse her own child. In case of the mother's having consumption or syphilis, nursing the child by the mother is contra-indicated, owing to danger of infecting the child.

The early application of the child to the breast promotes uterine contraction. As a rule, it is put to the breast after the mother has rested six or eight hours, sometimes earlier. It should be nursed once in four hours during the first few days until mammary functions are established. Usually the child will learn to nurse before the onset of the true milk secretion, and the painful engorgement of the breast will be diminished. Regularity in nursing is essential to both mother and child. The milk becomes concentrated by over-frequent suckling, thin and diluted when the intervals are too long. For this reason the child should not be permitted to sleep in the same bed with its mother, but should lie in a crib by itself. Bathe the nipples after each nursing with boric solution and carefully dry and dust with bismuth powder. If the nipples are disposed to crack, burnt-alum powder is very effective for this purpose. Each time before nursing, the breasts must be washed. Cocoa butter is also very soothing to fissured nipples. During the first days of lactation the breasts frequently become fearfully swollen. Painful induration of the gland in the absence of inflammation is relieved by gentle massage, stroking the breasts outward from the base toward the nipple. This is best practised immediately before putting the child to the breast.

Distension from overfree secretion is relieved by saline cathartics, by abstention from too much liquids, and by the use of a compression breast bandage. This is made of a straight piece of muslin, with a shallow notch cut in one edge for the neck and a deep notch for each arm. The bandage is closely applied over the breasts, the ends being pinned in front.

Not infrequently, especially in debilitated women, the supply of milk is insufficient. The most reliable evidence of defective lactation is afforded by signs of inanition in the child. If the infant ceases to gain in weight, or if weekly gain falls short of the normal, in the absence of disease it is to be assumed that the quantity or quality of the mother's milk is at fault. Attention to hygienic measures may improve the character of the mother's milk. Generous diet, including the use of milk, and attention to the hygienic surroundings of the mother, will improve the quantity; but caution must be taken not to eat more than can be digested. The daily application of a mild faradic current through the breasts, it is claimed, stimulates the mammary functions. Sulphate of strychnine, in doses of one-fortieth to

one-sixtieth of a grain, before meals daily, has a good effect as a general nerve tonic.

In case of death of the child, where the milk must be dried up, an expectant treatment usually answers. A compress-binder may be used. Daily applications of oleate of atropia are of great value for the relief of pain and their specific effect in drying up the secretions. Restriction of liquids and the use of saline cathartics also help. The iodide of potassium, from ten to fifteen grains, doses repeated two or three times daily, exercises a remarkable influence in diminishing the flow of milk.

Tardy Involution.—Nothing is better than the faradic current of electricity for hastening involution; galvanism is also useful for this purpose. Friction applied two or three times daily is useful. This should be done gently, so as to give no pain, for about ten minutes each treatment.

A mild faradic current of ten to fifteen minutes daily, or the galvanic current of twenty to thirty milliamperes, may be given the same length of time. The positive electrode is placed over the fundus of the uterus, or just above the pubis, and the negative electrode placed over the sacrum. A hot vaginal douche once or twice daily is of value for promoting involution. The temperature should be 115° Fahrenheit, and two gallons of hot water may be used. Ergot, in grain doses of the solid extract or its equivalent (fluid extract) may be given three times daily. Sometimes retarded involution is due to a septic condition of the endometrium. The remedy is a thorough curetting of the uterine cavity. An antiseptic gauze drain may be left in the uterus after curetting. The gauze should be removed on the second or third day, and sooner in case of fetid lochial discharges, and the uterus washed out with corrosive sublimate (1 to 5,000); the temperature of the water must not be over 110° Fahrenheit.

Special Directions.—Considering the pressure effects of the term of gestation, and especially the latter part of pregnancy, the impaired nutrition, the loss of exercise and physical powers of many women, it is not surprising that childbirth is followed with more or less general debility, even in the absence of complications. Restorative measures, therefore, are necessary for convalescence.

Plenty of sleep and proper diet have been alluded to. In addition to these, tonics are of much service. In anæmia iron is called for. Gude's peptomangan is especially valuable. Park, Davis & Co.'s iron peptonate of manganese, administered in dessert-spoonful doses, three or four times a day in a wine-glass of water, are necessary to promote strength. The arsenate of iron is especially efficacious in the treatment of anæmia in puerperal women. Attention to the digestive organs is necessary, and the amount and character of the patient's food should be regulated. If the appetite is poor, a bitter tonic may be prescribed.

(Elixir of calisaya with strychnine.)

℞: Elixir calisaya.....℥vi
Nucis vomici.....℥jss
Mix.

Teaspoonful just before meals, in water, three times a day.

A good general tonic is iron, quinine, and strychnia (J. Wyeth), elix. of iron quinine et strychnia, in teaspoonful doses after meals.

Special attention should be given to the pelvic organs during the post-partum month. The first ten days after labor, a digital examination should be made to ascertain the progress of involution; after that the position and size can be determined by abdominal examination. After the third or fourth week the uterus should be examined with special reference to size, and shape, and position. If the uterus is retroverted, it should be reposited, and held in place by a suitable pessary for about three months. Often persistent retroversion may thus be prevented.

If there is persistence of the red flow, or an abnormally open cervix, it is to be taken as evidence of endometritis. Iodized phenol, or Churchill's tincture of iodine, are recommended by some writers, to be applied to the endometrium at intervals of three days. Curettage, with drainage, is most effectual; so, also, is Apostoli's method of intrauterine raclage, which is the galvanic current of electricity applied to the fundus of the uterus with a suitable carbon electrode of proper size to fit the endometrium. The positive pole is placed over the subpubic region, and the negative pole in the uterus; the current is applied for seven minutes to the endometrium, or fundus, and then the electrode is brought down to the junction of the cervix and applied the same length of time. The operator may give from ten to twenty milliamperes aseptically each time, and every third day for four or five times. To the cervix may be applied Churchill's tincture of iodine, or dry dressing of boric acid and bismuth, with antiseptic gauze packed around the uterus. This method has been most successful in the writer's hands.

Regulations of the Lying-in.—The length of time necessary for rest after labor varies with different women. During the first week she ought not to leave her bed. Ordinarily, with strong, robust women, they can rise partly or fully to the sitting posture for micturition; this favors, also, the expulsion of blod-clots. Throughout the second week the patient, if robust, may recline on a lounge, provided involution is going on properly; during the third week a portion of her time may be spent in an easy-chair. She should not be allowed on her feet until after the third week. A very delicate woman should not sit up at all till the end of the second week, and not then if involution is retarded from the enfeebled condition of the general system; she should take the rest-cure for at least six weeks, till her constitution is restored to its normal condition.

CARE OF THE NEW-BORN INFANT.

Immediately upon the birth of the child's head, its face, should opportunity permit, should be bathed with warm water; the eyes especially should be be cleansed and carefully dried before the child is even separated from its mother. This is done as a preventive against ophthalmia. As a still further preventive, within a half hour or an hour after birth, the eyes should be washed with boracic-acid solution, about five grains of boracic acid to one ounce of boiling water; first wipe the eyes and drop into them enough to wet them; one or two drops are sufficient, or wet a cloth and lay over the eyes for a few moments at a time. A one per cent solution of nitrate of silver is recommended as a prophylactic against ophthalmia; after bathing the eyes in warm water, drop in one or two drops once a day for a few days. Should this treatment cause a serous oozing, it may be promptly controlled by a single application of a drop or two of a one-half per cent solution of the sulphate of atropine.

Ligation of the Cord.—The ligation of the umbilical has been alluded to. The common practise is to tie from one and a half to three inches away from the umbilical; place the second ligation about three-quarters of an inch from the first one; both are to be tied as tightly as it can be drawn, with care to put no strain on the umbilical insertion. Before tying, pinch the cord very firmly, or strip it back towards the mother with the left fingers, while with the right hold it firmly so as to thin the cord should it not be a thin one already, because this prevents or lessens the danger of hemorrhage from the umbilical. The tape should be from one-fifth to three-fourths of an inch wide, and should be dipped in boiling water beforehand, and should be damp when it is used, to prevent it from slipping when tied. With clean scissors cut the cord between the two ligatures. Press the stump with a soft, clean cloth, to be sure there is no bleeding. Usually respiration is promptly established at birth. When the new-born infant does not breathe properly soon after birth, means should be employed to secure the full expansion of the lungs. Useful measures for this purpose are blowing forcibly upon the face, dashing a few drops of cold water upon the chest or the face, or gently slapping the buttocks with the hand. The efforts should be continued until the child cries lustily. When respiration is obstructed by mucus in the throat, the offending material may be removed by the finger wrapped with a soft rag. Suspending the child by the feet a few moments facilitates drainage of liquids from the air passages.

Care must be taken to protect the child from chilling. It must be carefully wrapped in warm flannels, and, as soon as the cord is cut. laid in a warm place until the necessary attentions to the mother are completed. While it is moist, the head should be covered, as well as the trunk and limbs. Inspect the navel cord occasionally to see that it does not bleed from loosening of the ligature as the stump shrinks.

Bathing.—The first bath, if the child is robust, may be given soon after it is separated from its mother; if feeble, the bath should be postponed for several days. In the latter case, inunctions of sweet-oil, vaseline, or fresh cocoa butter are to be substituted for the general bathing. As a preliminary to the first cleansing, the skin is to be well rubbed with sweet-oil or some fatty material to facilitate the removal of the vernix caseosa; then wipe the child clean ready for its bath.

If the weather is cold, the toilet should be made in a warm room, preferably in front of an open fire or grate. It must not be forgotten that a child, until the moment of its birth, has always been in a temperature of 98° to 100° Fahrenheit, and that any prolonged exposure to cold after birth may be followed by disease and even death. The nurse should have on hand, and within easy reach, a cup of clean cold water, a large basin of hot water, from 100° to 105° Fahrenheit, also have old white castile soap, a teacup of fresh hog's lard or a bottle of olive-oil, and soft wash rags; old muslin is as good as old linen for the purpose.

Sitting in front of the fire, the babe is turned upon its back, and the toilet begun and conducted as follows: The nurse should begin at the mouth, and, with a clean rag over her finger, wash it out. After cleansing the mouth thoroughly, you may give the child a few drops of water or a little warm sweetened water, by letting it suck from a piece of clean rag or from a teaspoon. The next step is to remove the sebaceous matter from the child's skin. Take a piece of old flannel, and, keeping the child well wrapped in its covering, begin at the head, and rub the surface briskly with oil or lard; instantly the sebaceous coating disappears, dissolved by the lard or oil. The capillary circulation is stimulated by the brisk rubbing, and becomes active, the surface becoming a bright red color. Similar application must be given to the rest of the body. Now give the bath in a systematic way, keeping the body well covered and beginning at the head. The hot water, with plenty of castile soap, soon removes the oil and sebaceous matter; be careful not to get any soap about the eyes.

Conjunctivitis in the new-born child may be due to other causes than the acrid secretion of the maternal parturient surfaces. Among these causes are exposure to cold, to too bright light, and last, but by no means least, the careless application of soap to the eyes during the first bath. After the head is washed and carefully dried, the same application is made to the whole body, the child still kept covered save the part undergoing the cleansing process. Speedily the parturient soilings are all removed, and the infant is then ready for its grand and final hot bath (not too hot). For this purpose, it is best to have a large wash-basin or a bath-tub containing clean hot water, temperature 100° to 105° Fahrenheit; into this hot bath the whole body of the infant save its head is now to be immersed, and the bath prolonged

from a minute to two or three minutes until the child is thoroughly rinsed. In this last bath the child usually cries vigorously, which is beneficial in completely establishing the respiratory function and stimulating the general as well as the capillary circulation. On removing the infant from the bath, it should be wrapped in a small, hot, soft absorbing towel (Turkish towel is the best), and gently and thoroughly dried. The nurse should now change the apron she has worn during the bath for a fresh, dry one, before dressing the infant.

Dress the cord by enveloping the stump in some soft, clean, boiled, absorbing material, usually some old linen or muslin rag; antiseptic gauze is preferable for dressing the stump, but a simple dressing that an uneducated person may perform is the main object I want to impress upon the country nurses, who have not had hospital training, as we never know when you may be called upon to perform this needful work. The most simple dressing is, roll up the stump of the cord until about four thicknesses of the cloth cover it; tie a soft string around the covering, bring the covering well up against the belly; now wet the covering with sterilized olive-oil, and fold another piece of cloth about the width of your hand (two thicknesses will do), and place it over the cord, turning the cord to the left towards the chin; then apply the bandage. Some writers recommend adhesive plaster for fastening down the cord.

The bandage should be made of flannel, wide enough to reach from the hips to the axilla, and long enough to go twice around the child's body; it should not be hemmed. After turning the cord towards the chin, you will now secure the bandage with small safety-pins. Be careful not to apply the bandage too tightly, but as loosely as is consistent with its use. Then put on the clothing; baby powder may be used freely. A child properly washed and dressed will sleep immediately after its toilet is made. If it should cry, undress it, and see that there are no wrinkles or anything too tight. See that the infant's feet and hands are warm; when the doctor arrives, he will examine for all defects.

If the mother has recovered sufficiently from the fatigue of labor, it should be put to the breast; indeed, this early application to the breast is so very desirable for both mother and child that no ordinary circumstances should be permitted to postpone it. For the mother it is valuable in securing prompt and continued contraction of the uterus, thereby preventing post-partum hemorrhage and after-pains. Should the child not be put to the breast for any reason, it may be given a teaspoonful of warm sweetened water, and then be placed in a cradle on its right side, well covered (the face not too closely), and out of all draughts. It should be protected from exposure to all bright lights, and the surrounding atmosphere should be as clean and pure as possible.

CHAPTER LVI.

NASAL OBSTRUCTION.

"We are told in Genesis, that when God made man, it was not into his mouth, but into his *nostrils,* that He breathed the breath of life. The disastrous consequences to the organs of respiration, audition, and voice production from occlusion of their natural atmospheric channels, are too often lost sight of by those who, unmindful of this truth of scriptural physiology, sum up the varied functions of the nasal apparatus in the terse proposition, The nose is the organ of smell.

"The influence of nasal obstruction in the causation not only of morbid conditions of the whole respiratory tract and middle ear, but also of pathological changes in other and more remote organs of the body, is no longer a matter of interesting speculation, but is grounded on the firm foundation of every-day clinical fact and experience. The removal of nasal obstruction in young children is of special importance; for in them it means interference with the act of suckling and consequently with the maintenance of life." (J. Noland McKenzie.)

Obstruction of the nasal fossæ may be acute or chronic. We will speak especially of the chronic form. The lumen of the nasal passages may be congenitally narrow enough to interfere seriously with respiration, and it was this congenital anomaly, doubtless, of which Sylvaticus wrote over two centuries ago.

The nasal passages are much more frequently the seat of congenital abnormalities than the pharynx. The inference from history is that malformations of the naso-pharynx are of rare occurrence, because of the little mention made of them in works on teratology, and the infrequency with which isolated cases are encountered in periodical medical literature. Pliny the Elder tells us that children born in the seventh month frequently have the ear and nose imperforate. It is observed that whether the natural historian is correct or not, it is quite certain that occlusion of the posterior nares is the most common of congenital nasopharyngeal anomalies. The occlusion may affect one or both nostrils, and may be membranous or bony. The orifices of the posterior nares may be alone implicated, or the nasal fossæ may be obliterated in their entirety.

Effects of Nasal Obstruction.—The evil effects of nasal obstruction may be felt in almost every organ of the body. So important is a proper discharge of the nasal functions, not only to the structures directly involved, but also to the general welfare of the individual,

that the abrogation or suspension of the vital properties of the intranasal tissues may be looked upon as one of the most serious obstacles to the enjoyment of physiological life. This is especially true in early childhood, when growth and development are going on with rapidity, and when the demand for healthy respiration is accordingly all the more imperative. The bad health and stunted growth of children suffering from nasal obstruction are matters of every-day occurrence, unfortunately too frequently overlooked. (J. N. McKenzie, M. D.)

Nasal obstruction in children is the fertile source of many incurable respiratory and aural affections in after life. In nasal obstruction is a predisposition, other things being equal, to inflammatory conditions of the respiratory tract. Chronic inflammations have been induced in the bronchial and pulmonary mucous membrane, which are very difficult to deal with, even after the original cause has been removed, and the practical physician can not afford to overlook the influence which nasal obstruction exerts in their production. In this country the vast majority of cases of chronic laryngitis originate primarily in disease of the nose, and many a winter cough is allowed to go on from bad to worse because of failure to recognize this relationship.

It is thought, furthermore, that nasal obstruction may and does cause diseased states of the lungs, and in an individual so predisposed, may favor the development of pulmonary consumption. Frankel states that emphysema frequently coexists with nasal stenosis, and Kussmaul believes that acute hyperemia of the lung may be produced by forced inspirations of air. Frequently mucus and subcripitant rales can be heard in different portions of the chest.

Besides the part which the nose plays in the processes of olfaction, respiration, and voice production, it also serves as the channel of conduction of atmospheric air to the middle ear. The aural pressure is kept in a state of stable equilibrium by the constant supply of air to the cavity of the drum through the Eustachian tube. In the natural state this ventilation of the tympanum is continually taking place, not only as the result of the partial vacuum created in the nasopharynx during the act of deglutition, but also during normal nasal respiration. It follows, therefore, that anything which tends to obstruct the passages of air through the nose will interfere, to an extent varying with the amount of obstruction, with normal aural ventilation, and consequently with physiological intratympanic pressure. This diminution of pressure within the cavity of the drum, which can readily be demonstrated experimentally, leads necessarily to inward collapse of the membrana tympani, with consequent abrogation of function in the osseous and muscular apparatus of the middle ear. Catarrhal otitis-media, with its long train of phenomena, is the inevitable result. Fluid not infrequently accumulates in the tympanum,

which finds an exit ultimately by perforation of the membrane and leads to chronic otorrhœa. This same chain of events follows the obstruction of the Eustachian tube by growths in the pharynx, or the pressure of the hypertrophied nasal turbinated structures, or by inflammatory engorgement of the orifice of the tubes themselves. This cuts off the air supply from the tympanum, not only by direct occlusion of its natural channel, but also by interfering with the motions of the velum, and therefore with the opening of the tube by the tensor palati, or dilator of the tube. The intimate and direct connection of the blood supply of the tube and pharynx with that of the middle ear, and their anatomical continuity of tissue, favor, furthermore, the extension of the inflammatory process from the one to the other. Indeed, in very many cases the aural inflammation is merely a symptom of nasal catarrh, and gradually disappears without special treatment, upon the removal of its primary cause.

Inflammation of the tube may result in stricture; and in long-standing cases of salpingitis, fatty degeneration of the tubal muscles occurs, with the consequences described above.

These are by far the most common causes of chronic catarrhal inflammation of the middle ear. It is said to be impossible to exaggerate the part which diseases of the nose play in the production of inflammatory conditions of the middle ear. Between sixty and seventy-five per cent of all cases of ear disease originate primarily in morbid states of the nasopharynx, and the successful treatment of middle-ear catarrh will in the vast majority of instances depend upon their recognition and removal. The most common result of obstruction of the nasal passages is inflammation of the nasal pharynx. Extension of the inflammatory process into the ethmoid cells is also met with. Obstruction of the nasal duct is an occasional complication.

There is one symptom of nasal obstruction to which especial importance must be attached, and for which alone the physician is often consulted. Dyspnœa on exertion is one of the most annoying features of the case. Such patients complain that in talking they must frequently pause for breath; that in going up-stairs, walking rapidly, or running,—in short, in all bodily operations in which unusual exertion is required,—they readily get out of breath. Difficulty seems also present when the mouth is occupied or closed, as in swallowing, smoking, etc. Hemorrhage from the nose is not an uncommon symptom of nasal obstruction. It is usually excited by picking, scratching, rubbing, or blowing the nose, or by sneezing or coughing, by the separation of crusts, etc., that determine an increased flow of blood to the nasal membrane.

Sometimes such hemorrhages occur at night, from unconscious irritation of the nose with the finger during sleep.

The symptoms of advanced nasal obstruction have been well described by Meyer and others. The pallid countenance assumes a

dull, stupid expression, and the cheeks become flabby from elongation of the nasolabial sulci. The mouth is kept open, and the lower jaw depressed; the gums are fissured and cracked, and saliva dribbles from the mouth. Deafness and tinnitus are nearly always present. Neuralgia is common. Taste is impaired. The nasal discharge is profuse, excoriating the nostrils, filling the pharynx, preventing sleep, and provoking suffocating attacks.

These symptoms, with constant snuffling, are well marked among children and react most powerfully upon the general health. Later in life the nostrils become abnormally narrow from arrested development or collapse of the alæ nasi. The speech becomes nasal, the tone of the voice dull and "dead." (Meyer.) Obstructions in the nasal fossæ (polypi, etc.) prevent the free passage of the voice, and diminish accordingly the force of tone. All such obstructions as polypi and foreign bodies are removed by some form of surgery. Nasal polypi are not found in young children.

Reflex cough arises most frequently in the nasal passages. Of late years the nasal reflexes have been exhaustively studied by investigators in rhinology, and the wonderful revelations incident to these investigations have enabled us to appreciate the far-reaching and complex character of the influence emanating from this sensitive region.

The cough-center in the brain is said by Kohts to lie "on each side of the raphe in the neighborhood of the ala cinerea." Coughing is produced by stimulation of the sensory fibers of the vagus distributed to the mucous membrane of the larynx, trachea, and bronchi, the portion of the nasal chamber which is designated as "respiratory tract" is given as that in which the reflex acts of coughing arise.

The most sensitive parts of this respiratory tract are found where erectile tissue is most abundant, and particularly over the posterior portions of the lower turbinated bodies and septum.

It is said that by far the most common pathological state in which cough is produced is that of catarrhal inflammation, in the form either of acute coryza or of chronic hypertrophic rhinitis. Under such circumstances we have all conditions active for the reflex manifestations. The varieties of reflex irritation we will not discuss, except that of nasal cough. In the inflammatory conditions the sensory disturbances are readily induced, and cough excited either from hyperæmia, hypertrophy, or naso-motor disturbances, from irritants without, or from internal excitants, such as secretion or contact of swollen tissue, etc.

It is a well-known fact that a small pledget of cotton or a delicate probe introduced into the nasal chamber, in contact with certain areas, and in certain subjects, will cause a reflex act expressed by a cough. The production of nasal cough is of so great interest and clinical value in affections of children that one ignoring it, or neglecting to appreciate its true position in the successful management of many

affections of childhood, will often find the most vaunted remedies of no avail.

One of the most frequent and troublesome reflex coughs met with in children is the "night cough," a cough of nasal origin. Vogal speaks of it as a "periodic nocturnal cough." Nocturnal cough in an infant or child, without pulmonary implication, occurring toward midnight, the child being in the recumbent position, is almost certain to depend upon a catarrhal inflammation seated in the nasal passages or nasopharyngeal cavity. After the child has been asleep for several hours, an accumulation of secretion in the nasal chamber takes place, and turgescence of the posterior erectile tissue will be present. In the erect position this accumulation would be expelled from the nostrils or swallowed; but while lying down asleep, it will naturally take the direction of gravity, and lodge in the posterior nares upon the most sensitive areas, and from contact alone or upon movement of the mucus, produce an irritation sufficient to cause a cough; this cough is short, dry, irritative, and most persistent and intolerable. When this mucus is expelled, the child falls asleep and no further cough ensues until the following night. So long as the coryza continues, the cough may be produced.

Follicular pharyngitis, acute and chronic, often seen in children, gives rise to a reflex cough. This is generally a disease secondary to a chronic nasal catarrh. The enlarged follicles are often not only painful, but also very susceptible to irritation. Frequently the passage of air over these inflamed structures will produce a short, dry cough. Hypertrophy of the tonsils, so common in childhood, with many other symptoms, produce a cough which at times takes the form of suffocative attacks, and is paroxysmal. An elongated and inflamed uvula sometimes causes cough in children by mechanical irritation of the base of the tongue, though this is not a frequent condition in early life. Enlarged lingual papillæ or lymphoid tissue situated at the base of the tongue, when present in children, occasions a most obstinate dry cough, when this hypertrophied tissue interferes with the play of the epiglottis and irritates its lower surface. This condition, too, according to my experience, is not frequent in children, though common in adults.

Ear cough is uncommonly present in certain conditions of the auditory meatus and membrana tympani. This ear cough can be produced by irritation set up in the auditory meatus by accumulation of wax, when the serum is unusually dry and loosely confined in the ear. (Dr. J. C. Blake.) We see cases recorded of foreign bodies being removed from the ear, and the reflex cough disappears like magic.

Cough produced by irritation of the fibers of the vagus distributed to the alimentary canal has been called stomach cough. Undigested or indigestible articles of food remaining in the stomach have produced

cough, and the reflex phenomenon disappeared only when the stomach had ejected its contents.

Treatment.—The surgical measures for the removal of nasal polpi are three in number, viz., evulsion, abscission, and the galvano-cautery. Of these, evulsion with the forceps is by far the oldest method and the one most generally practised. In all cases the polypi should be removed by the aid of the rhinoscopic speculum or mirror, care being taken not to work in the dark. All such cases should be treated by a specialist of some experience.

CHAPTER LVII.

RHINITIS (NASAL CATARRH).

Definition.—This is a chronic affection of the nasal passages, hypertrophy of the pituitary membrane. These are hypertrophic tumors of the nose, and most often encountered in the young.

Treatment.—The galvanic current of electricity, applied with a platinum needle. After cocaining the parts, the positive pole is used at the base and the negative passed through the apex of the growth; give milliamperes enough to turn the growth to a blanched appearance, then reverse the current a moment so as to admit the removal of the positive needle without tearing the tissues. Usually one or two treatments effect a cure in the writer's hands. In all cases, tonics of iron and strichnæ are useful, also cod-liver oil, and occasionally an alterative for the liver aids in general nutrition. After the treatment, some bland antiseptic oil is necessary for the comfort of the patient. Carbolated vaseline is very good.

Extirpation is the treatment when the galvanic needles are not used, to overcome nasal stenosis.

The most important measures when the galvanic current is not available are the snare, ligature excision (with scissors), and disintegrating injections. The child should be treated as soon as the disease is observed. The symptoms of chronic rhinorrhœa in infants are inability of sucklings to take nourishment, attacks of suffocating spasms from obstructed respiration, habitual mouth breathing, constant sneezing; and in children, frequent complaint of headache and earache, nasal cough, constant raising and expectoration of ropy mucus, inability to breathe through the nose, especially during the night, with consequent disturbance of rest, dryness of the throat, and mental inaptitude.

When surgical measures can not be employed, various lotions may have to be tried for relief of infant. I have employed a lotion of linseed oil and spirits of turpentine with satisfactory results. It has the advantage of being cheap, so that every household can have it ready at hand for use in case of an acute coryza.

℞: Spt. turpentine.....ʒj to iss
Olium linseed.....ʒvi to ʒviij
Misce.

May be used with a small swab of cotton wrapped around the end of a burnt match or small probe of some kind. Or, if the child is too young to sniff the lotion, a dropper may be employed to pass

a few drops into the nostrils three times a day. Nasal lotions are, of course, always warmed before using. A variety of nasal lotions are in use, among which may be mentioned bicarbonate, biborate, benzoate, phosphate, and chlorate of sodium, in the proportion of from one to five grains to an ounce of fluid. These bland, unirritating salts of sodium are usually employed in solution with glycerine and a mere trace of antiseptic agent, like menthol, peppermint, salicylic acid, benzoic acid, carbolic acid, or bichloride of mercury.

Astringents are of doubtful efficacy to the pituitary membrane. These lotions should be very weak; with a post-nasal syringe flush the nasal cavities.

These local measures will naturally have to be combined with appropriate treatment of the effects of complications of catarrhal processes commonly observed in the ear, eye, pharynx, larynx, and throughout the system, as manifested by constitutional depression, nervous disturbances, and derangement of the various viscera.

CROUPOUS RHINITIS.

Croupous rhinitis follows the rule observable in all classes of diseases of the upper air passages characterized by the superficial deposit of fibrinous exudation, in that its onset is attended with well-marked evidences of general disturbance. In most cases the invasion is attended with a chill, although in many cases there is merely a chilly sensation. This is followed by general febrile motion. The thermometer, as a rule, on the first day will show a temperature of 102° to 103° Fahrenheit. The higher temperatures are not usually observed in the nasal disorder. In connection with the fever there is usually pain in the back, headache, depression of spirits, and the train of symptoms which are embraced under the expression general malaise.

Diagnosis.—Sneezing and watery discharges indicate, apparently, a cold in the head. This is soon followed by the development of the croupous membrane. The progress is very rapid, so that at the end of twenty-four to thirty-six hours it extends throughout the nasal cavity, resulting in complete stenosis, or closing up of the nasal cavity. In these cases it will be necessary to carefully wipe away the accumulation for the thorough inspection of the part; for it is a matter of importance that the condition should be recognized, and it should always be suspected in cases of an apparently ordinary acute rhinitis attended with marked general disturbance and high febrile motion. Very careful manipulation is necessary in removing the secretion, and careful inspection of the cavity with a good light, the reflected rays of the sun being always preferred as the source of illumination. On delicately manipulating the probe, it will be found that the false membrane can be lifted from the surface of the mucous membrane beneath, which then will be found absolutely

intact. In other words, the removal of the false membrane is attended with no rupture of blood-vessels, as is characteristic of the diphtheritic membrane.

Local Treatment.—The tendency after removal of the membrane is to a redevelopment. To prevent this we have no single drug which possesses the promptness and efficacy of the preparations of iron, and of these the tincture of persulphate may be used in full strength, provided the application is made with that nicety and delicacy of manipulation by which the unpleasant action of these drugs on the healthy structure may be avoided. Remove the membrane by a small cotton pledget on the end of the probe, care being taken to do no injury to the membrane beneath, the point being that if blood-vessels are ruptured, a certain danger arises of absorption of morbid material, which is always to be carefully avoided. After the membrane has been removed, the inflamed surface beneath should be carefully brushed over with small pledgets of cotton soaked in either persulphate or tincture of iron. This manipulation is to be repeated daily, or twice daily, until the morbid process is brought fairly under control. Where the exudation is a thin, continuous membrane, it is better to apply the tincture of iron over the membrane, as the iron checks the activity of the membrane as it destroys all activity in fibrinous deposits.

General Treatment.—The systemic condition in these cases is one of hyperinosis, and tincture of iron has the most controlling influence in this condition. Hence in all cases of croupous rhinitis, iron should be given for its systemic action.

℞: Tinct. ferri chloride.....ʒij
Glycerine ad .....ℨij
Mix.

Sig.: A half teaspoonful every four hours.

In addition to this, and especially in young children, mercurials unquestionably possess a certain power in controlling a fibrinous exudation. Hence they should be administered in pretty full doses in connection with the iron, until their action has been thoroughly tested. For this purpose the mild chloride:—

℞: Hydrarg chloridime mite.....grs. xx
Sacch. lact. ad .....ʒii
Sodae bicarb.....grs. xx
M. et div. in chart. No. 40.

Sig.: One to be given every four hours to a child, till three doses have been administered; eight hours after the last dose, castor-oil may be given to move the bowels. For adults, two powders may be given every four hours. Castor-oil may be given when necessary to move the bowels, while the syrup of rhubarb is administered as necessary for a laxative.

RHINITIS ATROPHICA, CHRONIC.

Definition.—Dry nasal catarrh is a chronic affection of the nose characterized by the shrinkage, or atrophy, of the pituitary membrane, without ulceration, and accompanied with the formation of mucus or mucopurulent crusts, which, as a rule, give rise to an offensive odor.

Diagnosis.—The distinguishing structural features of atrophic rhinitis are smoothness of the pituitary membrane, loss or reduction of the turbinated bodies, abnormal spaciousness of the nasal chambers, shrinkage of the adenoid tissues in the vault of the pharynx, and pharyngitis sicca.

The secretory peculiarities are the formation of crusts and nasal molds, pronounced fetor of the nasal discharges (ozæna), and marked diminution and thickening of the secretions. The most prominent symptoms are a sensation of dryness, nasal obstructions from the accumulation of scabs, headache, a stench compared by the French to that of crushed bedbugs, excoriations, and sometimes hemorrhagic abrasions caused by scabs.

Treatment.—The measures adopted for local treatment of the affection, are, first, the loosening and removal of the intra-nasal incrustations and thickened secretions; second, the prevention of the return of these conditions and the maintenance of the nasal chambers in a state of asepsis; and, third, the improvement of the general health.

There are various kinds of antiseptic solutions used by specialists, such as carbolic acid to the ounce of water, gr. ¼ to 3; salicylic acid, gr. 1 to 4; salicylate of sodium, gr. 5 to 10; sulphocarbolate of zinc, gr. ss to 2; solution of salt (chloride of sodium), ½ dram to 1 dram; benzoic acid, gr. ½; benzoate of sodium, gr. 1 to x; thymol, gr. ¼ to 1; permanganate of potassium, gr. 1 to 4; and bichloride of mercury (1 to 10,000). The proportion of each of the agents will, of course, vary with the condition of the patient to suit each individual case. Glycerine, when employed in conjunction with these antiseptic nasal washes in the proportion of from fifteen minims to a dram to the ounce, will be found to be a most valuable agent in promoting the removal of crusts, by its softening and solvent action, and soothing the irritated and oftentimes inflamed mucous membrane. Furthermore, the washes should be employed at a comfortable temperature, about blood heat or a little more.

The quantity of liquid should be copious, in order to remove crusts, and the douche should be used with some little force to project it effectively through the nostrils. A hard rubber postnasal syringe is to be preferred. Parents should be instructed how to use the postnasal syringe, and the nasal chamber should be washed out at least twice daily, namely, morning and evening.

Vaseline, lanoline, lard, cocoa butter, and gelato-glycerine are all suitable agents in loosening up crusts in the nasal cavity; and some

one of these lubricants should be used after using the douche; these remedies may be applied with a cotton swab or with a feather. Vaseline dissolved is easily sprayed into the intranasal cavity.

Linseed oil 4 ounces, spirits of turpentine 1 dram to 1½ dram, is a very efficient lubricant. The writer has used it in preference to all other lubricants.

The writer has used the galvanic current of electricity for loosening up the crusts in chronic rhinitis. A small aluminum wire is insulated with rubber nearly to the end of the wire, and a bit of absorbent cotton twisted firmly around the end of the wire—not too much cotton—this is dipped in a 20 per cent solution of cocaine. After having attached this wire to the positive pole rheophore, also having placed the negative electrode over the chest, pass the wire gently into the nasal cavity over the crusts, and let it remain from one to two minutes over each affected part of the nares till the entire cavity has been acted upon. From five or ten to fifteen milliamperes may be given, according to the chronic condition of the case. Treat each side the same. After the seance, apply the linseed oil and turpentine lotion. The galvanic current should be used twice or three times a week till the case is cured, or after all crusts cease to form in the nasal cavity; once every four days is often enough to use the electricity. The linseed lotion must be used night and morning daily till a cure is effected.

Constitutional treatment is necessary. Syr. hypophosphites; Gude's pepto-mangan; Wyeth's elixir of iron, quinine, and strychnæ; and Wampole's cod-liver oil, should be employed alternately, that is to say, take Gude's pepto-mangan for two months; after resting a couple of weeks, take Fellow's syrup of hypophosphites for six weeks; then use Wampole's cod-liver oil for two or three months till well, etc.

PURULENT RHINITIS OF CHILDREN.

In examining the literature on the subject, F. H. Bosworth, M. D., defines the term used to designate a form of catarrhal disease which is met with exclusively in young children, and is characterized mainly by a more or less profuse secretion of muco-pus from the nasal passages. Mackenzie[1] confines the use of the term to the acute form met with in infancy, and usually attributed to infection from the genital passages of the mother, although he questions the accuracy of this view; while under the chronic form he[2] would seem to refer to that curious affection first described by Stoerck as occurring as a local disease among the Poles, which consists in the development of a purulent discharge, mainly as the result of uncleanly habits,—a disease which runs an essentially chronic course, and is said to extend to the lower air passages, giving rise to dyspnœa, in one case tracheotomy having been required.

[1] "Diseases of the Throat and Nose," vol. 11, p. 294.
[2] Loc. cit., p. 335.

According to Bosworth, "purulent rhinitis is essentially a chronic disease, and runs an exceedingly protracted course, extending over from five to fifteen years, in all cases probably commencing in childhood. Its essential feature then consists of a rapid cell proliferation, resulting in profuse cell desquamation."

Causation.—The disease is said to be essentially a local one, and is in no way connected with any peculiar diathetic condition, nor is it the result of impairment of the general health. We simply say, then, as regards causation, that it is probably due to some errors in hygienic surroundings,—insufficient clothing or improper diet,—which lead in child life to a habit of taking cold, which at this time of life, as we have seen above, tends to manifest itself in the peculiar form of inflammation.

Undoubtedly in many cases it has its origin in an attack of measles, scarlet fever, or some of the other forms of exanthemata, which are frequently attended with catarrhal inflammation of some portion of the upper air passages.

Diagnosis.—A diagnosis in these cases is of the greatest importance, in view of the fact that if the disease runs on to the stage of crust formation, or ozena, we have to deal with an affection usually not amenable to treatment. Syphilitic or scrofulous disease of the nose is attended with pus discharge, the result of ulceration and necrosis.

In these cases the discharge, therefore, would be mingled with masses of black necrotic tissue, or portions of bone, which would be at the same time attended with an intolerably offensive odor that could never by any possibility be mistaken for the odor of simple purulent rhinitis. In addition to this, there would be the other evidences of poison in the system, such as a general cachexia, skin eruptions, or other syphilitic symptoms. Moreover, syphilitic disease of the nose is usually unilateral, while the affection of purulent rhinitis is always bilateral. Young children are exceedingly prone to insert small bodies into the nostril, but usually the child contents itself with inflicting this injury upon one nostril. The prominent symptom of the disease consists of a discharge from both nostrils of a somewhat clear, yellowish, thick, mucopurulent catarrhal secretion, which shows a disposition to form crusts in the lower portion of the anterior nares, or unsightly accretions around the margin of the nostrils at the muco-cutaneous junction. If the child is old enough to use a handkerchief, the discharge expelled stains the linen a bright yellow. If it remains in the nasal passages, it accumulates in such a way as to give rise to notable stenosis. During an acute exacerbation the amount of discharge is increased, while at the same time the mucous membrane is notably swollen, and the nasal stenosis markedly increased. In fact, the child suffers from an ordinary acute coryza.

If we make an examination anteriorly, we find the mucous membrane congested and of a dark-reddish color. The membrane is covered with flakes and masses of yellowish mucus, coating the lower turbinated bones and lying in masses on the floor of the nares. An examination of the pharynx, also, will usually show that the secretion has made its way to this region, and hangs down in shreds between the pharynx and soft palate. The source of this, of course, might be in an enlargement of the pharyngeal tonsil.

Course.—The disease commences at from three to six years of age, and runs a course of about ten or eleven years, before the crust formation sets in.

Treatment.—This is one of the diseases which is thoroughly amenable to local treatment, and that of an exceedingly simple character, the essential feature being that the cavity shall be thoroughly cleansed and sprayed with some simple astringent. For cleansing purposes one of the following is recommended:—

℞: Acid carbol ..... grs. iii
Sodii bicarb ..... grs. xii
Sodii biborat ..... ʒss
Glycerini ..... ʒvi
Aquæ ad ..... ʒvi
Mix.

℞: Listerini ..... ʒss
Sodii biborat ..... ʒss
Glycerini ..... ʒvi
Aquæ ad ..... ʒvi
Mix.

℞: Thymol ..... ♏ xx
Sodii chloride ..... ʒss
Sodii benzoat ..... grs. xx
Aquæ ad ..... ʒvi
Mix.

℞: Echthyol ..... gr. i
Potassii chloridi ..... ʒss
Liquor calcis ad ..... ʒvi
Mix.

This should be applied twice or three times a day if necessary by the means of some simple hand atomizer, the spray being thrown repeatedly into one and then into the other nostril, the child being directed to blow the nose thoroughly after the application until the parts are thoroughly cleansed. In very young children it may be necessary to use the nasal douche, which requires no effort on the part of the patient, possibly to employ a simple ear syringe. After the parts have been well cleansed, an astringent should be used as follows:—

℞: Zinci sulpho-carb .....gr. xx
Hydrarg chlor. corros.....gr. ½
Aquæ, ad .....℥iv
Mix.
℞: Acid borac.....℥ii
Aquæ, ad .....℥iv
Mix.
℞: Acid salicylici.....gr. vi
Aquæ, ad .....℥iv
Mix.

To either of the above may be added with benefit any of the simple astringents, such as glycerole of tannin, 1 dram to the ounce; orgenti nitratis, 3 grains to the ounce; yinci sulphatis, 3 grains to the ounce; cupri sulphatis, 2 grains to the ounce; aluminum aceto-tartrate, 10 grains to the ounce.

As before stated, the disease is purely a local one, and the patients usually enjoy good health. Hence there is no special indication for internal medication. Hygienic rules should be observed in the management of these cases, such as the daily administration of a cold sponge bath to the waist, together with careful attention to good nutritious diet, well-ventilated sleeping apartments, and especially to warm clothing. In all cases woolen underwear should be worn all the time both summer and winter, as we recognize a notable liability in these cases to taking cold.

The galvanic current of electricity applied the same as heretofore prescribed for catarrh is very effective in these cases. After each seance apply some one of the antiseptics already prescribed, or a little of the oil lotion of pure linseed oil may be used, four ounces to one dram of the spirits of turpentine. This may be applied night and morning till well. The galvanic current may be applied every third day till relieved.

CHAPTER LVIII.

THE SKIN.

The skin is a covering which invests the body completely, having three layers, namely, external, middle, and internal. It is a flexible membrane, and possesses both elasticity and extensibility. Upon its surface are numerous lines, or marks, of various forms and sizes, which are particularly well defined about the hands and feet. Large and coarse furrows occur about the joints and on the face. Numerous minute depressions also exist upon the surface and orifices of glandular ducts and of hair follicles. Hair, either fine or coarse, is found upon almost all regions of the body, and is more abundantly present on certain parts of the body than on others. To the touch the skin has a soft, smooth, somewhat unctuous feel.

In color the skin varies exceedingly, being encountered of all shades, from whitish-pink to black, according to the race. It varies in thickness, depending upon the locality; it is thickest on the back, buttocks, palms, and soles, and thinnest on the eyelids. It is to be considered as an organ of touch, by means of which we obtain knowledge of the object with which we come in contact. It is extremely sensitive. This sensibility is found in different parts of the body, being most acute upon the ends of the fingers.

The skin secretes both sebaceous matter and sweat, which serve to give it softness and suppleness. Certain regions give out the secretions in greater abundance than others. The scalp, for instance, is well provided with sebaceous glands, and the axillar with sweat glands. The function of perspiration is a most important one, and plays a conspicuous part in the physical economy; when it occurs in an imperceptible manner, it is termed insensible; when in excess, sensible.

The epidermis, or cuticle, is a membrane composed entirely of cells, which cover the corium in all its parts. It is a firm membrane, made up for the most part of connective tissue, together with elastic fibers, and contains blood-vessels, nerves, lymphatics, smooth muscles, hair glands, and flat cells.

The sweat glands are convoluted bodies situated deep in the corium, or, as is more often the case, in the subcutaneous connective tissue.

Primary lesions of the skin are many, and are of various sizes. They may be as small as a pin-head, or as large as the hand. In outline they are usually roundish, but they may also be irregular in shape. In color and tint they vary exceedingly. They may, in fact, be of

any color; the more common colors, however, are reddish, yellowish, and brownish. They are the product of diverse causes, and consequently represent a number of pathological conditions.

THE SEBACEOUS GLANDS—SEBORRHŒA.

Derivation.—The word is from the Latin *sebum,* suet. Seborrhœa is a disease of the sebaceous glands, characterized by a quantitative or qualitative change in their secretions, which may then discharge upon the surface as an oily fluid, or in the form of semi-solid fatty scales or plates, occasionally accompanied by dilatation of the orifice of the excretory ducts or glands.

Etiology.—Seborrhœa may be due to anæmia or cachexia of the physiological functions of the sebaceous glands as a consequence of causes operating upon the surface of the body, derangements of the alimentary canal, the infectious granulomata (tuberculosis, syphilii), exanthemata, inherited tendencies, or neglect of the rules of hygiene.

Pathology.—Seborrhœa is essentially a functional disorder, without primary structural changes of the sebaceous glands.

Symptoms.—Seborrhœa may be of the oily form, in which a fluid and oily secretion is poured out upon the surface; or of the dry form, in which the secretion is furnished in the form of fatty plates, or scales. The disease may be general, involving the entire surface of the body. This is a rare and dangerous disorder, apparently allied to ichthyosis, in which, after the removal of the physiological vernix caseosa of the infant, the skin is seen to be deep red in color, with a tendency to become fissured and to furnish rapidly a horny incrustation. Partial or local seborrhœa usually affects the scalp, furnishing thus a sequel to the condition represented by the prenatal cap of vernix here accumulated. In this condition thin or friable greasy crusts of dirty yellowish or brownish hue cover a slightly macerated, often ill-smelling surface. These may persist for months, and lay the foundation for a future eczema of the region. Seborrhœa of the face in children near the puberal epoch may form a greasy film of dirty, yellowish-green, somewhat adherent crusts over the forehead, cheeks, or nose, beneath which the skin is inactive, and macerated or inflamed. Often there are sensations of itching. Seborrhœa of the umbilicus in children is remarkable for the fetid odor of the secretion furnished, and for the reddened ring of eczematous skin surrounding the navel, which usually complicates the disorder.

In the genital regions the tight prepuce of male children may imprison a fluid furnished by the sebaceous glands, producing local, and, by reflection, general symptoms of disorder.

The same local symptoms may result from accumulation of the secretion about the labia and clitoris of young girls.

Diagnosis.—Seborrhœa is distinguished from eczema by the abundance and fatty character of the oily secretions and of its scale and

crusts, by the absence of the itching so characteristic of eczema, and by the absence of all inflammatory symptoms in the part affected. In psoriasis there are a more distinct definition, a more markedly circular outline, and more lustrous scales, the surface beneath them being reddened, and exuding drops of blood when these scales are removed.

Prognosis.—In children this is favorable.

Treatment.—Internal treatment of this affection often requires at the outset an alterative cathartic, such as calomel or gray powder, to be repeated as desired. Iron and cod-liver oil are indicated in many cases. The diet is to be regulated with special care, excluding pastry, confectionery, hot bread, and oatmeal. The general surface of the body should be cleansed daily with a soap-and-water bath. Often the sulphide of calcium, administered in doses of one-tenth of a grain three or four times a day, is found beneficial.

Locally all crusts should be softened by maceration in some fatty substance (as almond or olive-oil, vaseline, cold cream, or glycerine and water), then removed by washing in hot water and common toilet soap, green soap, or by the use of the alkaline spirit of soap of Hebra, sapo viridis two parts, alcohol one part, filtered and flavored with the tincture of lavender. After this a sulphur salve, one or two drams of precipitated sulphur to the ounce of salve-basis (lanoline or benzoinated sebum), may be applied.

Another valuable lotion is acid sulphurous, four drams to four ounces of water. First wash the affected part with sulphur soap and warm water; dry, and mop on the sulphur lotion for five minutes, and then apply the sulphur ointment. One ounce each of precipitated sulphur, alcohol, glycerine, tincture of lavender, and rose-water may also be shaken up together, and used as a lotion, and applied before using the sulphur ointment. Carbolated, borated, and salicylated spirit lotion, one part of each to one hundred parts of cologne water, with five parts of glycerine, is valuable for local applications to prevent the recurrence of these troubles. The spirit lotions are to be preferred in the local management of seborrhœa of the genital regions.

COMEDO.

Symptoms.—Flesh-worm, skin-grub.

Definition.—Comedo is an accumulation of inspissated secretion in the efferent duct of a sebaceous gland, exhibited exterially as a yellowish or whitish pin-head-sized elevation, with a yellowish, bluish, or blackish central point.

Etiology.—The causes of comedo are practically those of seborrhœa, but the former is more often encountered in children. More commonly there is general torpor of the secreting glands of the skin, associated with either visceral inactivity, chloronæmia, malnutrition, or systemic poisoning.

Symptoms.—Comedones are present in almost every face, being conspicuous only when numerous. They are scanty and widely distributed, or numerous and closely packed, bluish or blackish, pin-head-sized points, observed usually in greasy-looking skin. They are often associated with lesions of acne, occurring rather rarely on the scalp, much oftener inside the ears, on the face, neck, back, breast, and genital regions of children of both sexes, those especially near the puberal epoch. When expressed, a yellowish-white, worm-like, cylindrical mass, with a conspicuous blackish head, emerges from the slightly elevated, whitish rim of the follicle, from which circumstance is derived the common name of the malady, namely, the "blackhead," or "skin-worm."

Diagnosis.—The comedo should not be confounded with the blackish point produced by tar applied to the surface for medical purposes, or by alternate applications of mercury and sulphur, resulting in a deposit of the black sulphurate of mercury on the skin.

Treatment.—The comedo is readily expressed out by the comedo extractor, after which the gland that has been constipated requires the treatment in general which is needful for the relief of seborrhœa. The affected part is to be washed in hot water, with or without the tincture of green soap and cologne water. After the bath, friction of the surface with a bit of white flannel on the finger is generally efficacious. A simple and elegant lotion for this purpose may be made of a half dram each of the tincture of benzoin and glycerine to four ounces of rose-water. A weak solution of corrosive sublimate, one-half grain to one grain to the ounce of the above solution, may also be applied for the same purpose. The author has found that the galvanic current of electricity will remove the constipation of the sebaceous glands, the positive pole applied over the constipated part on the face, the negative pole over the chest or between the shoulders over the spine, for seven minutes over each part of the surface affected. Give from ten to twenty milliamperes. A portion only of the affected part may be treated each day till all has been treated. Usually a dozen treatments are all that is necessary to effect a cure. Oxide of zinc, one and a half drams to one ounce of vaseline, is beneficial after using the galvanic current. The electric needle (galvanic) may be applied to each comedo, positive pole active, or make the needle positive. The zinc electrode (negative) is placed over the chest. The needle is applied to the center of the comedo and passed into the comedo; give five to ten milliamperes, from one to one and a half minute to each comedo. Treat a few comedones every day till all have had the electric needle applied; then apply the oxide of zinc ointment.

ACNE.

Definition.—Acne is a chronic inflammatory affection of the sebaceous glands and periglandular tissues, in which variously-developed papulæ or pustules, tubercles, or reddish blotches appear,

usually upon the face or back, without producing marked subjective sensation.

Etiology.—Acne in its simpler forms is usually encountered at about the puberal epoch. It occurs in both sexes. It is rarely seen in early life. It may be caused from gastro-intestinal derangements, anæmia, cachexia, accumulation of filth upon the surface of the body, also struma, tuberculosis, and ingested medicaments.

Pathology.—The disease is usually caused by constipation of the sebaceous glands, and possibly results in the destruction of the gland and hair follicle.

Symptoms.—In acne, reddish or violaceous, pin-head to pin-sized inflammatory papulæ, or accumulated pustules and tubercles, few or numerous, often symmetrically disposed, appear upon the face, brow, nose, cheek, chin, the neck, or the back, often commingled and interspersed with comedones and minute roundish abscesses. Seldom there is produced a sensation of pruritus or burning. Acnea punctata is characterized by the development of papulæ, with a whitish or blackish comedo center.

Diagnosis.—Syphilis is readily distinguished from acne by the localization of the lesion of the latter disease, and by the concomitant symptoms of the former malady. Syphilitic papulo-pustules of the face tend to cluster about the angles of the lips. The scalp, anus, and other regions of the body usually furnish evidence of any specific disorder present.

Variola is an acute exanthematous disorder with vesico-pustulæ characteristically umbilicated. Impetigo has characteristic crusts. Acne is symptomatically not a disease of such type. Its crusts are always an insignificant part of the symptoms present.

Treatment.—The internal treatment of acne is largely that indicated by the general condition of the patient, including the correcting of gastro-intestinal disorders, the use of iron and cod-liver oil when indicated by anæmia and impaired nutrition. Occasionally glycerine may be given with advantage, in teaspoonful doses, twice daily. The bowels should be evacuated daily, and all injurious articles of food excluded from the dietary, as oatmeal, cracked wheat, and wheaten grits, the smaller seed-containing berries, hot bread and cakes, pastry, and confectionery. Fresh meats need not be excluded; fruits and vegetables are allowed. Poultry, fish, game, nuts, and very brown toasted bread may be eaten, also zwiebach. Regular intervals should be observed between meals, and no food should be taken except at mealtime. The entire body should be scrubbed daily from head to foot, in cool water and sulphur soap, in a warm room, in order to stimulate the secretory apparatus. After the bath, apply a sulphurous acid lotion, three or four drams of sulphurous acid in four ounces of water, and mop it on with a rag the same as in seborrhœa, then apply sulphur ointment. While shampooing, all pustules should be opened with a fine needle, thoroughly disinfected by dipping the needle in boiling

water with a little bicarbonate of soda in the water, and the purulent contents expressed. Locally the affected parts may be shampooed with the alkaline spirits of soap of Hebra with hot water; then apply the sulphurous acid, as above described, followed by anointing the affected part with sulphur ointment, rubbing into the skin finely-powdered sulphur once a day. This is best applied in the evening.

A weak lotion of corrosive sublimate, from one-eighth to one-half of a grain to an ounce of spirit, may be employed with advantage. Van Harlingen employs one dram of the sulphuret of potassium and the sulphate of zinc one dram to four ounces of rose-water; this may be applied.

Professor Una, of Hamburg, advises for external use before retiring to bed:—

℞: Benzoinated zinc ointment.....86 parts
Precipitated sulphur.....9 (or resorcin 10) parts
Silicious earth.....4 parts

And use during the day another remedy:—

℞: Resorcin.....2 to 5 parts
Glycerine.....1 part
Orange-flower water.....20 parts
Alcohol.....80 parts

Apply once or twice a day.

MILIUM.

Definition.—Milia are fine, isolated, pin-point to split-pea sized, having a pearly luster, covered with epidermis only, embedded within the skin.

Symptoms.—They are often seen partly embedded in the skin over the temples, near the eyes, or about the cheek, nipples, and genital region of the young in both sexes. Milia, when not treated, are usually in time thrown off from the surface of the skin with its natural excorium. The simplest treatment is by electrolysis, the milium, or the lesions, being punctured with a fine needle in an insulated needle-holder connected with the negative pole of from two to four cells of a galvanic battery, the positive pole being held in the hand of the patient, or placed over the chest wall. The sponge connected to the positive pole may be moistened with salt and warm water. Nitrate of silver (stick cautic) or nitric acid will remove them; this may be done by touching them with either of the remedies.

ASTEATOSIS.

Definition.—Asteatosis is characterized by a general or partial congenital absence or acquired diminution of the sebaceous secretions of the skin.

Etiology.—The disease may be produced by malnutrition, cachexia, disorders of the nervous system, or other cutaneous affections.

Pathology.—The skin, when examined, is found to be destitute

of its normal sebaceous secretions. There may be absence, atrophy, or temporary suspension of function merely, of the sebaceous gland.

Symptoms.—In asteatosis the skin is dry, inelastic, less extensible than normal, and destitute of its usual unctuous feeling. The hairs are usually thinned and lusterless or absent. The nails also may be rugose and friable. The skin, in consequence of these changes, often becomes fissured and oozing, or scaly and crusted, in the regions involved.

The slightest grade of this disorder is seen in some of the febrile diseases in childhood; the gravest, in severe ichthyosis, lepra, and inherited syphilis complicated with marasmus.

The congenital forms of this disorder, known as ichthyosis sebacea, are extreme manifestation of this condition, where children are brought into the world wholly unable to seize the nipple on account of the condition of the lips.

Prognosis.—The prognosis is favorable in mild cases.

Treatment.—The treatment is by external applications of oils, almond, cocoa, suet, palm-oil, vaseline. A mild climate is most suitable for such cases.

ANHIDROSIS.

Synonyms.—Anidrosis, hypohidrosis.

Definition.—Anidrosis is that morbid state of the skin in which there is a total absence of the sweat ordinarily effused upon the surface, or a diminution or arrest of sweating, as is indicated by a dry, harsh state of the skin.

Treatment.—The faradic current of electricity should be used to stimulate the nerves. For alkaline baths use—

℞: Spiritus ammoniæ aromatici,
Glycerinæ, aa. ..... ℥viii

M. For a thirty-gallon bath; use about twice a week.

HYPERIDROSIS.

Definition.—This is an effusion of the sweat secretion in relative excess, the fluid accumulating visibly upon the surface of the skin. It may be due to disorders of the nervous system, or to those of the circulatory system (the heart and blood-vessels). It may be due simply to an elevated temperature, too much clothing, summer weather, unusual exertion, or ingested medicaments.

Symptoms.—Localized hyperidrosis is limited to certain definite regions, such as the hands, feet, axilla, groins, temples, and genital regions. In generalized hyperidrosis, sweat is poured out in excess from all parts of the body. Children, and particularly infants, are especially liable to hyperidrosis (over-sweating) when kept in apartments with the temperature unduly elevated, or when they are too warmly clothed.

Diagnosis.—The diagnosis is readily made by considering the moist and sweating condition of the skin.

Treatment.—In general, in hyperidrosis due to adynamic states, the ferruginous tonics, mineral acids, and quinine are indicated. Many children require special attention to the digestive function, proper dietary, and hygienic regulations of the bodily clothing, the covering of the crib or bed, and the temperature of the apartment in which they sleep or play. Children habitually overheated are in as much danger of disease as those the surface of whose body is habitually chilled. Bathing in tepid salt water, usually one-quarter of a pound of salt to a gallon of water, or with soap and water, usually sponging, and followed by brisk friction of the surface, is to be recommended. If there is any visceral disease, cardiac cyanosis, or anæmia, salt is contraindicated. Sea-bathing surpasses in value in summer temperature. After the bath the sweating surface may be dusted with talc, boric acid, rice flour, or finely-powdered starch containing from three to five per cent of salicylic acid. Spirit lotion may also be employed, containing from one to two per cent of quinine, alum, tannic acid, or carbolic acid. If complicated with intertrigo, or any form of erythema, or eczema, when indicated, the unguentum diachyli albi of Hebra (see Eczema) or benzoated zinc salve may be used in the usual strength.

Hebra's formula is as follows:—

℞: Olei olivæ opt.....f℥xv
Pulv. lithargyri.....℥iii ʒvi
Aquæ.....q. s.
Coque, fiat unguent.

The oil is to be mixed with a pint of water and heated, by means of a steam bath, to boiling, the finely-powdered litharge being sifted in and stirred continually; the boiling is to be kept up until the minute particles of litharge have disappeared. During the cooking process, a few ounces more of water are to be added from time to time, so that, when completed, water still remains in the vessel. The mixture is to be stirred until cool. The ointment is difficult to prepare, and requires skilful manipulation. When properly made, it should be a light yellowish color, and of the consistence of butter. To insure a good article, it is essential that the very best olive-oil and the finest litharge be employed. If unguentum diachylon is improperly made, it will not have the desired effect.

Next to diachylon ointment is Prof. McCall Anderson's, which is composed as follows:—

℞: Pulv. bismuthi oxide.....ʒj
Acidi oleici.....℥j
Ceræ albæ.....ʒiij
Vaselini.....ʒix
Olei rosæ.....♏ iij
M.

This, when well made, is elegant. It resembles butter in appearance and color, and when skilfully perfumed is a most agreeable preparation.

CHAPTER LIX.

ERYTHEMA.

Definition.—Erythema is a redness of the skin that temporarily fades upon pressure, and that appears in the form of diffused, circumscribed, variously-sized lesions, usually without elevation above the skin.

Symptoms.—The eruptions may appear in the form of patchy redness, or in diffuse streaks of different size and shapes.

Etiology.—This form of erythema is brought about by the influence of external irritation upon the skin, which, if left unchecked, may go on to true inflammation. Erythema is also caused from heat and cold. Erythema is caused, also, from pressure, rubbing, scratching, and congestion arising from ill-fitting garments, instruments, etc., or the active disturbance set up by animal and vegetable poison.

ERYTHEMA PERNIO (CHILBLAINS).

These are localized erythematous congestions that are very common in weakly children, especially girls.

The usual sites for the disorder are their feet and hands, but it may attack the nose, cheek, and ears. Chilblains begin in congested patches from the size of a dime up to that of a dollar, which may coalesce and form a continuous band. They itch, tingle, and burn most distressingly. After repeated attacks, the affected skin often becomes covered with vesicles, which often break down, leaving an excoriated surface that may ulcerate.

Chilblains are liable to relapse each season, making their appearance in the fall, and not disappearing till warm weather. Children thus affected are not, as a rule, in good health.

Treatment.—The treatment is both internal and local; must tone up the system. The most useful drug is iron in some form (Gude's or Wyeth's). Peptomangan of iron is the best preparation. Dose, from one to three teaspoonfuls after meals three times a day, to be taken in a wineglassful of water or milk. For strumous subjects, cod-liver oil and the hypophosphites are indicated, together with the lacto-phosphate of lime and (Fellows') syrup of hypophosphites, a teaspoonful to a half teaspoonful for an adult, according to age; shake the bottle before using it; taken after meals. Cold general sponging with brisk toweling is of great advantage. The child should be made to wear stout, easy-fitting boots and woolen stockings. The patient

should sleep in a moderately warm room, and knitted bed-slippers should be kept on in bed during the night. For immediate relief for chilblains, very hot water application gives the most comfort.

Calomine and zinc lotion is very agreeable.

℞: Zinci oxidi 3ss
Pulv. calaminæ, præp.....ʒiv
Glycerinæ. ... .ℨj
Aquæ calcis..... ..... ℨvii

M. et ft. lotio.

Use several times a day.

Painting the parts freely and frequently (night and morning) with tincture of iodine gives great relief.

Belladonna liniment, painted upon the part, allowing it to dry, relieves itching.

Tincture of cantharides and soap liniment (1:6) is very beneficial, or equal parts of turpentine, spirits of camphor, and olive-oil will relieve itching. If vesicles or ulcers form, dress the parts antiseptically.

One of the most soothing remedies is spirits of turpentine two drams, zinci oxidi two drams, linseed oil two ounces. Cleanse the parts with warm water with a few drops of carbolic acid in the water, dry the parts, apply the turpentine and zinc lotion above prescribed.

When a chilblain is only a congested spot, it should be washed twice a day in cold salt water, and rubbed dry with flannel. Paint with tincture of iodine. The patient with chilblains must take regular outdoor exercise, and must not sit near a hot fire.

ERYTHEMA INTERTRIGO.

This form of erythema is always first a simple hyperæmia of the skin, which occurs on parts of the body exposed to friction from clothing or from two surfaces being in contact, as underneath the armpit (axilla), in the creases of the legs and neck, the gluteal furrows, the inner surfaces of the thighs, and the flexures of joints, especially in fat babies.

Intertrigo, or chafing, in infants may appear quite suddenly, and under proper management may last but a few hours; but if neglected or improperly treated, it may persist for weeks. It most frequently occurs in hot weather, although in infants it may be observed at all times of the year. There are relapses expected. The eruptions on the buttock by the irritation of fæces and urine are very common, especially in syphilitic children or infants.

Treatment.—Cleanliness is to be secured by washing with pure soft water and pure white castile soap, and frequent changing of the diapers. The infant must not lie with wet or soiled diapers on, as they will increase the chafing and inflammation.

The diapers should be washed with castile soap and thoroughly rinsed. The author witnessed the death of an infant (a girl), which

was due to an acute inflammation of the buttocks and genitals, caused by the use of diapers washed with lye soap and not properly rinsed.

For immediate removal of, and protection against, irritating discharges, a simple dusting powder may be used:—

℞: Zinci oxidi.....3ij
Pulv. sem. lycopodii.....3vi
M. et ft. puls. Keep the parts dusted.

After the disease has become established, lint should be kept between the folds, in small pieces, to keep the parts separate. The following lotion is useful:—

℞: Argentum nitras..... gr. viii
Aquæ distil.....℥ij
M. et ft. lotio.

Cleanse the parts with warm water, apply the lotion with a soft rag or mop it on gently, then apply oxide of zinc ointment plentifully.

Zinci oxidi.....3jss
Vaseline.....℥j
M. et ft. unguentum.

Keep the affected parts separated with a bit of lint.

Duhring advises Lassar's paste:—

℞: Acidi salicylici.....gr. x
Zinci oxidi
Amylis, aa.....3ij
Vaseline.....3iv
M. et ft. unguentum.

Keep the affected parts anointed by spreading thinly over the surface.

SYMPTOMATIC ERYTHEMA.

Evanescent congestions of the skin during dentition are quite common in children who are teething or suffering from some slight derangements of the alimentary canal. These rashes generally assume the roseolar form, and are accompanied by a slight elevation of temperature and perhaps some redness, without swelling of the palate and fauces. It is said to be most common over the sacral regions and buttocks. It usually disappears in a few hours to a few days without desquamation.

Treatment.—A mild laxative is all that is needed; also nutritious and easily-digested food.

FURUNCLES (BOILS).

Definition.—A furuncle is an acute, circumscribed, phlegmonous inflammation occurring around a skin gland or follicle, and terminating in suppuration and the expulsion of a central slough, or core.

Etiology.—When boils occur singly, it will be found that they have been caused by some local irritation, the pressure of ill-fitting instruments, prolonged lying down (or decubitus), or the irritation of the skin by rough garments. It is a well-recognized matter of experience that furuncles occur in connection with a variety of constitutional states of depressing character, as in diabetes, variola, measles, scarlatina, etc. Von Rittersham states that after exfoliative derminitis of infants, furuncles often follow eczema, and are very annoying and often protracted.

In hot summers, children are very subject to prickly heat, which is often accompanied by crops of furuncles. A most painful and persistent furunculosis is often seen in connection with chronic intestinal catarrhs of children.

Diagnosis.—A boil may be distinguished from a carbuncle by its smaller size, its more pointed shape, and its single point of suppuration, whereas a carbuncle is generally solitary, much flatter, and larger than a boil, has an indurated border, and, in addition to its several openings, the overlying skin is completely destroyed.

Prognosis.—The prognosis of boils is usually good.

Treatment.—The first duty is to put the patient in the best possible condition of health; if there is sewer gas or arsenical wall paper they should be removed and remedied. The dyspeptic, the anæmic, and the strumous should each receive appropriate treatment. Very often change of scene and air is beneficial.

Yeast is an old-fashioned "cure." An adult may take a half wineglassful night and morning. Sulphide of calcium, half-grain doses every four hours for adults, for children may be administered in doses one-tenth to one-fortieth of a grain four times a day.

Syrup of hypophosphites (Fellows'), for adults, teaspoonful after meals three times a day, to be taken in a wineglassful of water.

Cod-liver oil emulsion is beneficial in strumous children.

L. Heitzmann strongly recommends an eight per cent of salicylic acid plaster or salve.

Tincture of iodine is often beneficial; it must be put on in successive layers, and allowed to encroach a little on the healthy skin. He also advises that all other lesions of the cutaneous surface be similarly treated, to prevent their development into furuncles.

Lowenberk uses a saturated solution of boracic acid. Verneuil recommends a two per cent solution of phenic-acid spray. The following application is recommended by Halle and Jamieson:—

℞: Tinct iodine.....3j
Acid tannic.....3ss
Pulv. acaciæ.....3ss

Mix. Keep the boils painted with it.

Hardaway's plan is to apply to the furuncle a piece of Una's plaster. Carbolic acid and mercury plaster on mull, cut so as to cover the

lesion and project a little beyond. On no account should poultices be made to encourage suppuration.

After using Una's plaster of a few hours' application, it will generally be found that the boil has burst, or that the slightest prick with a knife or needle will cause the pus to flow out. A small hole may be cut in the center of the plaster corresponding to the apex of the boil. Squeezing and other manipulations should be avoided. After the furuncle has burst, the cavity should be treated antiseptically. Wash the cavity with peroxide of hydrogen with equal parts of warm water; apply with a dropper, then use carbolized oil. Olive-oil one ounce, carbolic acid three to five drops, or turpentine and linseed oil may be used. Turpentine one dram, to one ounce of linseed oil, is very beneficial. If the turpentine should burn, add a little more linseed oil; apply with a dropper, and put on absorbent lint. Dr. H. N. Spencer says he uses an application of an ointment composed of extract of arnica, extract of belladonna, and morphine to alleviate pain, and to prevent the occurrence of others; he also uses compression. He adds that the knife should not be employed; and poulticing, syringing, and the instillation of warm water or drops of any character, are to be condemned, entering largely, as they do, as factors in producing ear trouble. Absorbent cotton is the best thing for absorption that can be used. Pressure that is brought to bear uniformly upon all the walls of the canal prevents the development of furuncles, by its influence upon the circulation, at the same time that it operates upon those which have formed to promote resolution or the culmination of their discharge.

The After Treatment.—This should look to their local cause, and remove it. If any inflammatory trouble exists, whether of the meatus or tympanic cavity, use Dr. H. N. Spencer's unguentum:—

℞: Ext. arnicæ ..... ℥jss
Morphiæ sulphate ..... gr. viii
Ext. belladonnæ ..... gr. viii
Vasilini .....
Lanoline ad ..... ℥ss
M. et ft. unguentum.
Sig.: Keep the ointment applied and use compression.

PHLEGMON (ULCERS).

Definition.—Phlegmon is an inflamamtion of the cellular or areolar tissue. This tissue is present in the human body from head to foot.

It may be acute, diffused, or circumscribed, chronic, or malignant.

Etiology.—It is described as occurring idiopathically, but H. Tuholske, M. D., believes it to be mostly secondary to an existing neighboring inflammatory or necrotic process, or of trans-mutico septic origin. It is often associated with phlebitis or lymphangitis, of which at one time it may be the cause, and at another the effect;

or with erysipelas, from which it differs in this, in phlegmon the cellular tissue is primarily inflamed, while in phlegmonous erysipelas the inflammation of the skin and cellular tissue results from the same cause, or the skin is affected first, and the cellular tissue secondarily. It may be of puerperal origin. The pathological process is everywhere the same.

Symptoms of Acute Phlegmon.—After the first day or two, when the patient complains of a tender, stiff, tingling feeling, the swollen part becomes shining and painful, frequently very much so; the swelling is diffuse, uniform, slightly raised above the surface, and without a well-defined border. Although the skin does not participate primarily, or at first, it presents a reddish, erythematous appearance, which, as the disease progresses, becomes brawny, dusky, and œdematous. The swelling, which at first had been tough and inelastic, loses in firmness, becomes doughy and finally soft, and if not too deeply situated, fluctuation becomes distinct. The suppurating process will now spread in the direction of the least resistance, following the sheaths of tendons which it involves, and along the veins and fascias toward the integument, until this, in one or more places, eventually gives way and allows the discharge of pus and necrotic debris.

As a rule, if nature has her way, this takes place only after pieces of fascia have been destroyed, tendons have become necrotic, and the destructive process has spread far beyond its original limits. Then the slough gradually separates, a reparative process assisting in their removal; granulations form, and the patient recovers, some shortened tendon, contracted fascia, or fistulous tract remaining as lasting evidence of the destructive tendency of the disease. The patient suffers with fever and chills at the time of the pus formation. In any case thrombosis of involved veins may lead to infarction in the lung, or a thrombus becoming septic to suppurative embolic processes.

Treatment.—General treatment is valuable; promptly meet every indication as it presents itself; but local treatment is paramount.

Watch the patient's temperature and secretions, and administer, if the bowels are constipated, a laxative, also quinine and nutritious food.

The remedies to be applied locally are mercurial inunction with absolute rest of the part, and elastic bandage. H. Tuholske recommends absorbent cotton wrung out of a two-per-cent solution of carbolic acid, enough to envelop the affected part and cover beyond it; cover the cotton with oil silk, and retain it by a bandage snugly applied. This should be changed two or three times daily. A flaxseed and laudanum poultice may accomplish the object. Whenever the presence of pus can be located in children, incision, deeply and multiple rather than extensive, should be promptly made, and followed by thorough infection, complete drainage, and antiseptic dressing. If the presence of pus can not be demonstrated by the sign of fluctuation, because of its

being too deeply situated, but is inferred by the œdema and pitting and intense localized tenderness, incision is demanded.

The furuncle is a typical circumscribed phlegmon.

ULCERS.

Definition.—An ulcer is solution of continuity in the surface of the skin or mucous membrane, deeper than its epithelial covering, and maintained by causes local or general. In all cases it results from the molecular death of a portion of the skin or mucous membrane itself, a sequel to a suppurative inflammation, and disposed less to the formation of granulation tissue than to a progressive destruction along its periphery.

Etiology.—The action of the pus cocci is the same as in an abscess. A broken abscess becomes an ulcer, and an ulcer is a half section of an abscess. An abscess arises from molecular death in the tissues; an ulcer, from molecular death of a free surface.

Classification.—Ulcers are classified into groups according to the condition of the ulcer and the constitutional state of the patient. All ulcers, whatever their origin, are either acute or chronic, and such conditions as great pain, hemorrhage, œdema, exuberant granulations, phagedæna, sloughing, struma, gout, syphilis, scurvy, etc., are to be looked upon as complications.

The leg is so common a site for ulcers as to warrant special description. Acute ulcer of the leg may follow an acute inflammation, and may be acute from the start, or may be first chronic and become acute. It is characterized by rapid progress and intense inflammation. In shape these ulcers are usually oval.

The bottom of an acute ulcer is covered with a mass of gray, aplastic lymph, or it may have upon it large greenish sloughs. The edges are thin and undermined. The discharge is very profuse and ichorous, excoriating the surrounding parts. The adjacent surface is inflamed and œdematous. There is a burning pain. When the ulcer spreads with great rapidity and becomes deeper as well as larger in surface area, it is called "phagedænic." If sloughs form, this indicates that tissue death is going on so rapidly that the dead portion has not time to break down and be cast off. Constitutionally there is gastro-intestinal derangement, but rarely fever.

Treatment.—De Costa recommends giving a dose of blue mass, or calomel, followed in eight or ten hours by a saline laxative (two drams each of Rochelle and Epsom salts.) Order light diet. Do not give stimulants except in diphtheritic ulcer. Administer opium if the pain is severe.

Use a spray of peroxide of hydrogen; remove the sloughs with scissors and forceps, and after their removal wash the ulcer with corrosive sublimate solution, one to five thousand. If the sloughs can not be removed, use the antiseptic poultice, and have at hand a bottle

of linseed oil with carbolic acid in it,—four ounces of linseed oil to thirty drops of carbolic acid,—and spread a little of this over the poultice before applying.

After asepticizing, local bleeding is of great value. De Costa recommends tying a fillet below the knee; then make multiple punctures, and let the patient sit with his leg in tepid water until a few ounces of blood have been lost (from five to ten ounces); untie the fillet, dress with antiseptic poultices, keeping the leg elevated. In two days paint around the ulcer with equal parts of tincture of iodine and alcohol, and repeat this treatment every day, dressing the ulcer with antiseptic gauze (either salicylated or treated with iodoform). After painting the ulcer, apply a roller bandage; flannel is to be preferred.

If the discharge is offensive, use gr. iij of chloral to every ℥j of lead In any case thrombosis of involved veins may lead to infarction in the water.

A twenty-five per cent ointment of ichthyol is highly valuable. If sloughs continue to form, touch with a pure solution of carbolic acid, and re-apply antiseptic poultices. If the ulcer continues to spread, clean it up with peroxide of hydrogen, dry with absorbent cotton, touch with nitrate of mercury solution (1:8), and apply a poultice. Do this every day until the ulcer ceases to spread, and granulations begin to form.

If the ulcer is covered with a great mass of aplastic lymph, touch it daily with a solution of nitrate of silver (gr. xxiv to ℥i to ℥ij of water), and dress with iodoform gauze. Give internally tonics,—elixir iron, quinine, and strychnia, or Fellow's syrup of hypophosphites after meals, a teaspoonful dose in a wine-glass of water. If iron alone is needed, Gude's or Wyeth's peptomangan of iron is very useful. A little tincture of nux vomica may be added to the mangan of iron, ʒjss to ℥xii. The dose of the peptomangan is from one to two or three teaspoonfuls, according to the condition of the patient. Stimulants are useful, and plenty of good food is needed. In all cases where granulations form, the leg should be dressed with dry dressing. If granulation is slow, touch every day with a solution of silver nitrate (gr. x to ℥i of water), or with a stimulating ointment (resin cerate or ʒj of unguentum hydrarg. nitratis to ʒviii of unguentum petrolii), or with an ointment of copper sulphate (gr. ii to iii of unguentum petrolii). The author has found linseed oil and turpentine to be very useful in the following proportions:—

℞: Linseed oil.....℥iv to vi
Turpentine spt.....ʒj to ℥ij
Oleo Harlum.....ʒj to iss
Mix.

Wash the ulcer with warm water, to which a few drops of carbolic acid have been added; dry with a soft rag or absorbent cotton, anoint with the oil, lay on iodoform gauze, apply more of the oil, lay on absorbent cotton (a small bit); apply oil silk over this, and then a

roller bandage. I have seen old ulcers heal very readily under this treatment.

The leg should be kept elevated until pretty well healed, and it must be kept snugly bandaged until well. If there is much aplastic lymph, cleanse it with perchloride of hydrogen, and dress as above advised.

In treating chronic ulcers, give a saline laxative every day, Epsom salts one dram, Rochelle salts one to half an ounce, taken in a half tumbler of water every day.

Chronic ulcer may be chronic from the start, or it may be acute. More usually it is found as a solitary ulcer two inches above the internal malleolus. Syphilitic ulcers occur in groups, are often chronic, and are frequent upon the front of the knee. A chronic ulcer is circular or oval, and is surrounded by congested, discolored, and indurated skin, and there is often eczema or a brown pigmentation of the neighboring skin. The patient must take tonics, eat nourishing food, and have plenty of rest.

Dr. De Costa draws blood by shallow scarification of the bottom of the ulcer, and through the skin into the deep fascia. After the incision is made, dress antiseptically for two days, keep the part elevated, permitting contraction, allowing granulation to sprout in them, which aids in the absorption of the exudate. In two days after scarification or incision, the ulcer is scraped with a curette until sound tissue is reached; then make radiating incisions through its edge. Use antiseptic poultices for two more days; then paint around the ulcer with tincture of iodine and alcohol (1 to 3), and dress the leg with laudanum and hot lead water. When healing begins, treat it the same as for healing acute ulcer.

Complications.—Remove by scissors and forceps any useless tissue; take out dead bone; slit sinuses; trim overhanging edges. Treat eczema by attention to the bowels and stomach, and locally by washing with Johnson's ethereal soap and by the use of powdered oxide of zinc or borated talcum, the leg being wrapped in cotton.

Avoid ordinary soap, grease, and ointment; those used must be antiseptic. Varicose veins demand either ligation in several points, excision, or the continued use of a flannel roller bandage or a Martin rubber bandage, or a silk rubber stocking. Inflammation is met by rest, elevation, and painting the neighboring parts with dilute iodine,—iodine and glycerine equal parts,—and by the use of a hot solution of lead water and laudanum. Calloused edges may be cut away; ordinary thick edges can be strapped. Use adhesive plaster in strapping, and do not completely encircle the limb. When the parts are adherent, completely or partly surrounding the sore, the deep fascia may be cut through to favor granulations. If the bottom of the ulcer is foul, dry it, and touch it with a solid stick of nitrate of silver; repeat this every third day, and dress with an antiseptic poultice until granulations appear. Superfluous granulation must be touched with nitrate of sil-

ver. When a woman having an ulcer must go out, use a firmly-applied roller, or, better still, a Martin bandage. The bandage may be used as follows:—

Before getting out of bed, spray the sore with peroxide of hydrogen by means of an atomizer, dry off the froth with absorbent cotton, wash the leg with castile soap and water, dry it, and put on the bandage, all of which should be done before putting a foot to the floor. At night after getting in bed, take off the bandage and wash with soap and water, and dry it, and again cleanse the leg and ulcer. If these rules are not strictly observed, the Martin bandage will produce pain, suppuration, and eczema of the leg.

Ulcers in Any Region.—The fungus, or exuberant ulcer, is found especially common in burns and other injuries when cicatricial contraction causes venous obstruction. These granulations bleed when touched. Burn them off with a stick of nitrate of silver, and strap or use the rubber bandage. Irritable or painful ulcers are very sensitive; this is due to the exposed nerve filament. They are especially found near the ankle, over the tibia, in the anus, or in the matrix of the nail (in ingrowing nail). Curette the ulcer, and touch it with pure carbolic acid, or with the solid stick of silver nitrate. Chloral, gr. xx to one ounce of water, applied on lint, allays the pain.

Phagedaenic Ulcer.—The phagedænic ulcer, which means the profound microbic infection of tissues debilitated by local or constitutional disease, is commonly venereal. This ulcer has no granulations, and is covered with sloughs; its edges are thin and undermined, and it spreads rapidly in all directions, and requires the use of strong caustics, followed by iodoform dressing. Internally use tonics and stimulants.

Rodent, or Jacob's Ulcer.—This is a superficial epithelioma, developing from sebaceous glands, sweat glands, or hair follicles.

Bed-sores are due to pressure upon an area of feeble circulation. The perforating ulcer commonly affects the metatarso-phalangeal joint, or the pulp, of the great toe about a corn. The part about the corn inflames, and pus forms, which runs into the bone; a sinus evacuates the pus by the side of the corn. Treatment of perforating ulcer consists, according to Treves, in going to bed and poulticing. Every time the poultice is removed, the raised epithelium around the ulcer is cut away, and then the poultice is re-applied. In about two weeks an ulcer remains surrounded by a healthy tissue.

Treves treats this sore with glycerine made to a creamy consistency with salicylic acid; to each ounce of this mixture add ten minims (ℳx) of carbolic acid. He directs the patient to wear, during the rest of her life, some kind of form of bunion plaster, to keep off pressure. If in a perforating ulcer the bone is diseased, it must be removed.

Fistula.—A fistula is an abnormal communication between the surface and an internal part of the body, or between two natural

cavities or canals. The first form is seen in a rectal or a biliary fistula, and the second is seen in a vesico-vaginal fistula.

Fistulas may result from congenital defects, from sloughing, traumatism, and suppuration. Fistulas are named from their situation and communication.

A sinus is a tortuous tract opening, usually, upon a free surface, and leading down into the cavity of an imperfectly-healed abscess. A sinus may be an unhealed portion of a wound. Many sinuses may be due to pus burrowing subcutaneously. A sinus fails to heal because of the presence of some fluid (as saliva, urine, or bile); because of the existence of some foreign body, as dead bone, a bit of wood, a bullet, a septic ligature, etc., or because of rigidity of the sinus walls, which rigidity will not permit collapse. Sinuses may be due to want of rest and to general ill health.

DECUBITUS (BED-SORE).

A bed-sore is the result of local failure of nutrition in a person whose tissues are in a state of low vitality from disease or from injury. Such sores are due to pressure, aided by the presence of urine and fæces, sweat, wrinkling of sheets, or to the dropping of crumbs in the bed. The pressure interferes with the blood supply, the weakened tissues inflame, vesiculation occurs, sloughs form, and an ugly ulcer is exposed.

Treatment.—The "ounce of prevention" is here invaluable. From time to time alter the position of the patient, if possible; keep the patient clean, maintain the blood distribution of the skin by frequent rubbing with alcohol and a towel, and keep the sheet clean and smooth. When congestion appears, at once use an air-cushion, and change the position of the patient. Let the affected part rest on a downy pillow; it will give great comfort. Not only protect, but harden the skin; wash the part twice daily, and apply spirits of camphor, or glycerole of tannin, or rub with salt and whisky (℥ii to oj), or apply a mixture of ℥ss of powdered alum, fl℥ii of tincture of camphor, and the whites of four eggs; apply two or three times a day; or apply tannate of lead; or equal parts of oil of copaiba and castor-oil; or paint on a protective coat of flexible collodion.

When the skin seems on the verge of breaking, paint it with a solution of nitrate of silver (gr. xx to ℥i of water). When the skin breaks, a good plan of treatment is to touch once a day with nitrate of silver solution (gr. x to the ounce of water), and cover with zinc ichthyol gelatin. We can wash the sores daily with 1:2000 corrosive sublimate solution, dust with iodoform, cover with lint, and spread with oxide of zinc ointment. When sloughs form, cut them off with scissors after cleansing the part. Slit up sinuses, and use antiseptic poultices; in obstinate cases use the continuous hot bath, or the intermittent ice poultice. When the slough separates, dress antiseptically with carbolic acid in warm water, or with corrosive sublimate solution as above described, or equal parts of resin cerate and

balsam of Peru may be used. If healing is slow, touch occasionally with silver solution, gr. x to ℥j of water. The patient should be stimulated, well nourished, and should have good sleep.

URTICARIA.

Synonyms.—Nettle-rash, hives.

Definition.—Uticaria is an inflammatory, non-contagious affection of the skin, characterized by the more or less sudden development of wheals, associated with burning, tingling, and itching sensations.

History.—Urticaria may occur as a sudden outburst, almost furious in its character, involving much of the surface and causing great suffering; or it may appear more slowly, with the development of a few wheals, which may come and go even for a period of weeks and months.

Etiology.—The etiology of urticaria is frequently very obscure; while in certain cases, especially of the more acute form, it will be caused by irritating food, such as fish, strawberries, pineapple, etc., or by an acute attack of indigestion, or by certain drugs, especially quinine, in a large proportion of cases, it seems impossible to trace the eruption to any special cause, and the most rigorous attention to diet will fail to produce any beneficial effect upon the disease.

It is recognized, however, that in the main urticaria depends upon disorders of the digestive system, and in children it is not infrequently caused by the presence of intestinal worms. In certain cases there will be a marked periodicity in the eruption, and it will be found that malaria is the cause of it, and this can be checked by quinine.

Pathology.—The immediate causation of the wheals of urticaria lies, in all probability, in vasomotor disturbances, which may have either a central, a peripheral, or reflex origin. The essential element in the production of the wheals is a spasm of a localized tuft of blood-vessels, followed by relaxation and the consequent effusion of fluid, producing a localized œdema in the skin. The sensation of itching, burning, and tingling are the natural result of the compression of the sensitive nerves by the exudate, or may be in part due to the same direct or reflex irritation which excited the vascular spasms.

Several varieties of urticaria are described, and may be observed. We have:—

Urticaria Communis.—This represents the eruption when the wheals, of whatever size or shape, remain such during their course.

Urticaria Papuloso.—This variety is more commonly seen in children than in adults. In it there is, in addition to the wheals, which are generally about half an inch in diameter, a small papule developed in the center, which remains after the subsidence of the wheal, and, consisting of organized lymphs, may persist for a day or two.

Urticaria Tuberosa.—Occasionally this form may take on great size, some of the elevations being raised up to the size of half a large walnut: but this rarely occurs in children.

Urticaria Oedematosa.—When lesions are developed in situations where the tissue is lax, as about the face, there may be a very considerable amount of œdema, so that even the eyes may be closed, and the tongue or lips may be greatly swollen; these are, however, generally very transitory, and do not call for active interference.

Urticaria Bullosa.—In rare instances, vesicles and blebs of greater or less size, are formed in connection with urticarial wheals.

Diagnosis.—There is very little difficulty in diagnosing most cases of urticaria. The sudden appearance of the wheals, the peculiar burning and itching, and the irregular and more or less general distribution of the eruption, are generally sufficient to make the diagnosis.

Prognosis.—The prognosis of urticaria will differ greatly in different cases. Acute outbreaks caused by indigestion or irritating food commonly cease in a few days under appropriate treatment and proper regulation of the life of the patient. But if neglected, the acute may run into the chronic state, which may prove rebellious.

The papular urticaria in children will sometimes persist for weeks or even months, in spite of the best treatment; but in the end the disease is curable in most cases.

Treatment.—Simple acute cases of urticaria may require little more than evacuation of the stomach, if offending matter is still there. A moderate purge of castor-oil or rhubarb and soda, and a little cream of tartar water drank rather freely, will do good. But in chronic cases the utmost care in regard to diet, together with internal and external treatment, will often be required. In some instances, careful attention to diet will fail to make any impression on the case. During the entire course of the disease the diet should be plain, simple, and unstimulating, though abundantly nutritious, and a very moderate proportion of sugar should be used. Alkalies are necessary in most cases.

Rhubarb and soda mixture with peppermint water is made as follows:—

℞: Sodii phosphatis.....ʒvi
Rhubarb.....ʒvi
Aquæ menth pip.....ʒvii

M. et sig.: For an adult, a dessertspoonful after meals is sufficient to secure a moderately free action of the bowels daily. Acetate of potash, one to two drams, may be added to the above mixture. The dose for a child under twelve years of age is from half a teaspoonful to a teaspoonful.

Alternating with this, iron and arsenic or cod-liver oil will generally be found sufficient for the cure. The hypophosphites are also frequently called for, and quinine, for children, may sometimes be given in free doses with the best of effect.

℞: Syr. of hypophosphites (Fellows').....ʒiv
Essence of pepsin (Fairchild's).....ʒiv

M. sig.: For children under twelve years, give from half a teaspoonful to a teaspoonful, according to age, to be taken in a wine-glass of water. For an adult, two teaspoonfuls after meals in a wine-glass of water.

Locally the free use of the following lotion will generally be found to give relief. At the onset of an acute attack of urticaria, manifested by tingling, burning, and itching, the rash making a bold appearance upon the surface of the skin, rub dampened soda bicarbonate (baking soda) upon the affected parts for a few minutes, and then take a hot bath for about ten minutes, with plenty of soda in the bath water; it will give quick relief. Take a quick laxative to move the bowels freely. A tablespoonful of the flour of sulphur, with molasses, is very useful, and almost every family has these on hand, or a dose of Epsom salts is good. After the hot soda bath, the patient must be kept in a warm room for several hours.

The hot soda water may be kept applied until all the eruption has disappeared, by mopping on hot soda water, and keeping the parts covered until relieved. The following is found to be very beneficial in giving quick relief:—

℞: Pulv. calaminæ præp. . . . . ℥j
Zinci oxidi. . . . . ℥ij
Acidi carbolici. . . . . ℥ss
Glycerini. . . . . ℥iij
Aquæ calcis. . . . . ℥iv
Auqæ rosæ, ad. . . . . ℥iv
Mix.

This lotion may be applied several times daily, or when desired for relief of the itching, day or night. In some instances a powder gives the most relief, and the following, well rubbed on the skin with the palm of the hand, forms a very agreeable application. After the soda bath, the surface of the body should be dried and thoroughly anointed with carbolated carmoline:—

℞: Unguentum petrolii. . . . . ℥ij
Acid carbolici. . . . . ℥ss
M. et ft. unguentum.

Keep the affected parts anointed.

HERPES (ZOSTER).

Synonyms.—Zona, shingles.

Definition.—Shingles is an acute inflammatory eruption, exhibiting groups of vesicles upon an inflamed and very sensitive surface corresponding to a definite nerve tract, and accompanied by more or less neuralgic suffering.

History.—Shingles usually comes on with neuralgic pain, more especially from acute indigestion; but it may come on without any disturbance of the digestion. The pain may be very acute in the part about to be affected; sometimes there may be a little fever.

Etiology.—Atmospheric changes, cold draughts, and exposure to wet, can cause the nerve inflammation associated with the eruption. Zoster is quite common among children.

Pathology.—The skin lesion in zoster, or shingles, is the direct result of irritation of the nerves distributed to the affected skin. This irritation may exist in any part of the course of the nerve, but is most commonly found in the spinal ganglia, and a number of autopsies have demonstrated intestinal neuritis of the posterior or sensory ganglion, as was first shown by Bareusprung; but later researches have also demonstrated this to be healthy in some cases, while neuritis existed in other portions of the nerve. Cases are also reported where there was hemorrhage into the Gasserian ganglion, also into the cauda equina, in a case of aural herpes; also where there was disease or injury of the spinal cord, and many other conditions inducing nerve irritation and inflammation.

Symptomatology.—The eruption of zoster is developed along the line of some distinct nerve tract or area, most commonly about the trunk, and with the rarest exceptions is always confined to one side of the body. The eruption, however, often laps a little over the middle line, owing to the interlacing of the nerve filaments of the two sides of the body, but it can not continue around the body. Where there is a double zoster at the same line, as is reported, it will make a complete circle, or girdle, around the body; and these cases are not any more dangerous than others, notwithstanding the popular superstition to the contrary. The eruption may also follow any nerve line, and is not uncommonly seen along the limbs, and, especially in adults, along the tract of the cranial nerves. The separate lesions begin with one or more inflamed patches, tender to the touch, as if burned or scraped, and giving the sensation of heat and burning to the patient. Within a few hours, minute points can be seen, which soon develop into vesicles, and may be closely set or scattered. The eruption is developed first near the root of the nerve, the patches or the more distant portion following even some days later; in some places the eruption may stop short at the erythematous stage. It takes from three to ten days for the disease to reach its height, and about the same length of time for the lesion to dry up, although often the crusts may remain adherent for three weeks or more, and if the surfaces are irritated, ulceration may follow, which will take a longer time to heal. The amount of the eruption varies in different cases. In some there will be a broad band over the affected surfaces, with the groups of vesicles almost or quite touching one another; in other cases the inflamed patches and groups of vesicles may be small and separated some distance apart, and occasionally but a single group or two will appear, perhaps with some erythematous redness between.

Diagnosis.—The one-sided character of the eruption is always a striking feature, as also the grouping of the lesions along the nerve tracts. Even early in the course of the disease, the erythematous

patches are tender to the touch and very sensitive, and accompanied by more or less neuralgic suffering.

Prognosis.—Zoster, or shingles, offers a favorable prognosis. Scarring may result about the face, and may prove troublesome; and when the eruption is located about the eye, that organ may be endangered; a certain amount of neuralgia may also persist after the eruption is cured. Neither of these features is common in children.

Treatment.—Very little internal treatment is required other than to meet symptoms, as internal medication can influence but slightly the course of the disease. The neuralgia will require nerve tonics, especially quinine. A sugar of lead and laudanum lotion gives relief, and hastens the eruption in drying down, followed by oxide of zinc ointment.

℞: Plumbi acetas ..... ℥ij
Tr. opii ..... ℥ijss
Aquæ, ad ..... ℥vi
M. et ft. lotio.

Saturate a small bit of absorbent cotton, and lay it over the affected parts during the day, and at night apply oxide of zinc ointment.

℞: Zinci oxidi ..... ʒjss
Vaseline ..... ʒj
M. et ft. unguentum.

Every morning wash the affected part very carefully (not removing the scab) with a little castile soap and warm water; dry it, and apply the lead and laudanum lotion. The affected part must be bound up to prevent rubbing. The clothing may slip over it and cause irritation and pain. Some authors recommend fine starch or rice powder with a little morphine and zinc oxide; dust thickly, and put on absorbent cotton and a bandage to prevent rubbing or friction from the clothing. This dressing may remain intact several days; when taken off, the eruption will be found quite dried up. If the vesicles should break, and the cloth stick to them, remove the cotton by soaking, and then apply fresh powder and a thin layer of absorbent cotton, which may be allowed to dry on, and may even be left until the surface is entirely healed. Where the pain is great, the galvanic current, applied directly over the lesion, will give relief, and will arrest the eruption. In applying the galvanic current, first apply a ten or twenty per cent solution of cocaine, for about five minutes, over the affected part; then put the positive pole over the part affected, and the negative pole may be put somewhere along the spine, or may be placed over one of the lesions if not too near the positive. Apply for seven minutes or more over each group of lesions until all the affected parts have been treated. Then after the treatment apply oxide of zinc ointment or the powder already prescribed.

PEMPHIGUS.

(I will quote from Dr. L. D. Bulkley.)

Definition.—Pemphigus is an acute or chronic inflammatory disease of the skin, characterized by the successive formation of bullæ of various sizes generally upon a slightly inflamed base.

Etiology.— Pemphigus is essentially a disease of lowered vitality, and most probably of nervous origin; in adults it not uncommonly follows nerve exhaustion. In size the bullæ may vary from that of a small pea to that of half the size of a large egg, generally rising in globular form abruptly from a slightly inflamed base.

Pathology.—Little is said to be known of the real pathology of pemphigus.

Symptomatology.—The three forms of pemphigus present such different phenomena that they require separate description.

Acute Pemphigus.—This is the form of disease which is seen principally in children, and as pemphigus neonatorum often proves very fatal, occasionally appearing almost as an epidemic in lying-in institutions, occurring principally in feeble and ill-nourished children and amid unsanitary surroundings. Cases of acute pemphigus may differ greatly in severity, from mild cases where a comparatively few bullæ develop on different parts of the body, the disease running a favorable course in two or three weeks, to severe and fatal cases, which may take on a gangrenous aspect,—pemphigus gangrenous,—the child perishing in ten or twelve days. Pemphigus is apt to follow convalescence from acute febrile diseases, as scarlatina and measles, and in young infants.

Chronic Pemphigus.—This is the more common form in adults, and it occurs more or less frequently in children. The eruption generally begins quite acutely, with the outburst of one or several bullæ, which may appear suddenly as small, clear, globular vesicles, almost as if produced artificially with a drop of scalding water. They enlarge rapidly, and in a single day may attain the size of a small egg. The lesions never run together, and seldom touch each other.

In some cases the crops of vesicles will appear in rapid succession, each day producing a number; in other cases their development will be more tardy, and one crop will almost dry off, when a fresh one will appear, and thus the disease may be prolonged indefinitely. The lesions may appear upon the lips and tongue, and in the buccal cavity and pharynx, rendering deglutition and talking very difficult. The amount of distress which may be caused by this disease is very great, the sufferer being often unable to lie in any position, or to make any movement without tearing the raw surfaces left after the bullæ. If not checked by treatment, these patients succumb, perhaps after months, worn out by constant distress and by a diarrhea which can scarcely be checked.

Diagnosis.—This may sometimes be very difficult, and care should always be exercised to eliminate the other conditions in which bullæ may appear. Thus we may have them from artificial causes, as burns, chafing, or irritating external applications, also from certain drugs taken internally. They are also seen sometimes in erythema and urticaria, also in eczema, and occasionally about the hands and feet in scabies. Herpes zoster and hesper iris may present quite large bullæ, as also varicella and impetigo contagrasa. They are sometimes seen in erysipelas, and finally are not uncommon in infantile syphilis.

Prognosis.—This will vary greatly according to the individual case, and must always be given very guardedly, for few diseases run a more uncertain course than pemphigus. Relapses may come when least expected, and no reliable indications can be stated from which one might judge certainly of a favorable course of the disease. The large majority of cases recover.

Treatment.—Arsenic appears to have the most controlling influence over pemphigus; but to be of real value it should be given freely and fearlessly. It is especially serviceable in children, and is remarkably well borne by them. It should be given, diluted in at least one-quarter or one-third of a goblet of water, every two or three hours, in doses increasing in quantity, until the disease yields or until some signs are given that it disagrees with the patient. Usually diarrhea will be the first sign of disagreement; and even then, if the disease is not checked, it may often be continued freely, and this action may be checked by adding a little opium, which also acts favorably on the disease. Attention should be given to the general state of the patient and supporting treatment given; but alcohol is prejudicial to the eruption.

Locally, great difficulty is often experienced even in making the patient tolerably comfortable. The blebs do better if punctured near the base with a fine needle in one or two places and the serum allowed to ooze out, and the covering made to rest on the base of the bulla. This should be preserved in every case as long as possible. Sometimes thin layers of absorbent cotton serve the best. When there is a raw surface, a very mild ointment of oxide of zinc, half a dram to the ounce of rose-ointment, or cucumber-ointment, with half a dram of tincture of camphor, or a few drops of carbolic acid to the ounce, will afford most relief. When there is much denuded surface, comfort has been obtained by a continuous warm bath, in which the patient may lie on a mattress, Hebra keeping some patients in this condition for many months in comparative ease; but much use of water, except in this manner, is prejudicial in these cases, and rather tends to the development of new blisters.

ECZEMA.

Synonyms.—Salt-rheum, moist tetter, scall, milk crust.

Definition.—Eczema is a constitutional affection in which it is often impossible to trace any local cause for the eruption.

Foremost among all diseases of the skin in importance, both from the members affected and the distress occasioned, must always come this ever-varying eruption—eczema. It attacks all classes and conditions, from the cradle even to the grave, and appears about equally in both sexes. Eczema is defined as a non-contagious inflammatory disease of the skin, of constitutional origin, acute or chronic in character, manifesting any or all of the results of inflammation at once or in succession, and accompanied with burning and itching; a tendency to exude a serous discharge, which stiffens linen and dries into scales or crusts, and in later stages, an infiltration or thickening of the skin, which then cracks, producing painful fissures.

The earliest local phenomena in eczema are nerve and capillary disturbances, and the skin lesions are to be looked upon as secondary to these. Eczema has been well spoken of as catarrh of the skin; the exudative feature is rarely absent at some period of its course.

Symptoms.—There are six general symptoms of eczema. These are: First, itching, pricking, or burning pain; second, redness from congestion; third, papules, vesicles, pustules, or exudation; fourth, crusting and scaling; fifth, infiltration, or thickening; sixth, fissures, or cracks. Itching is the most prominent and constant symptom in eczema, which may be preceded by, or give place to, a burning pain. The itching is always worse when exposed to the air.

There is usually an elevation of temperature in the part affected with redness from congestion. This redness disappears momentarily on pressure; but after it has continued for some time, a yellowish staining remains.

The exudate of eczema, which stiffens and stains linen, has a very strong tendency to dry into crusts and scales. If a discharging surface is left exposed to the air, it soon becomes glazed over and slippery, but dry in place of being sticky. This coating increases from beneath, and forms scales, or crusts, of varying thickness, especially in infants, as in "milk crust" upon the scalp. The masses may be very great, and on removing them the surface is still moist beneath.

Infiltration, or thickening, belongs to chronic eczema, but is seen more or less in every case. The skin acquires a hard, leathery condition, and this thickening may extend even through the entire corium, and on the legs.

Fissures, or cracks, are closely connected with the infiltration or leathery condition, and they occur and pass into subacute eczema.

Subacute Eczema.—This term refers to a less inflammatory condition, with a reddened, itchy surface, and moderate thickening. The diseased portions may be moist, tending to become scaly or crusted, or they may be hard and papular, exuding a glairy fluid when scratched.

Chronic Eczema.—This term is applied both to an eruption of long duration, and to the condition which usually obtains in old cases. Chronic eczema is characterized by reddened and thickened skin, which itches furiously and may desquamate freely, or exude if scratched.

Where there is motion, there is a tendency to fissures, which may be very painful. Itching may be absent in particular cases of chronic eczema.

The lines of demarcation between these three conditions are not well defined; but the distinction between the acute, inflammatory state and the chronic, indolent condition, is of great importance. In the acute stage the mildest, most soothing, and astringent applications are called for; in the chronic, very severe stimulation may be required.

We have four special varieties, or conditions, of eruption, which relate to the anatomical lesions constituting the eruption. These are eczema erythematosum, eczema papulosum, eczema vesiculosum, and eczema pustulosum. There are other forms which are commonly recognized as eczema, namely, eczema madidans, eczema squamosum, eczema sclerosum, and eczema fissum.

Eczema Erythematosum.—There is always some infiltration or thickening of the part, and the surface has a harsh, leather feel, and may be more or less scaly.

Eczema Papulosum.—This lesion is composed of papules, perhaps existing alone or combined with other former conditions, or with occasional vesicles.

Eczema Vesiculosum.—This form is comparatively rare, and is generally acute. More commonly the vesicles have broken down already into moist surfaces, or hard patches, when presented for treatment. Where the epidermis is thick, as on the palm surface of the hand and fingers, the vesicles appear in pearly or boiled-sago-like points. The burning and stinging are generally relieved when vesicles are formed, and often cease when they discharge.

Eczema Pustulosum.—Here pustules take the place of vesicles, either from the intensity of the inflammation, or from the lowered or strumous condition of the patient. Pustular eczema, as seen in "milk crust" in infants, presents a mass of yellow crusts only. Pustules of hairy parts seldom itch much.

Eczema Madidans.—This results from a shedding of the epidermis, which may either result from a chronic eczematous process or may occur acutely. It is often observed typically on the lower legs.

Eczema Sclerosum.—This relates to the thickening of the skin, which forms almost the sole feature of the case, as upon the palms, the soles of the feet, and the finger-tips. This form leads to the next.

Eczema Fissum.—This presents cracks of varying size and depth, often very painful, as is seen on the ends of the fingers.

The face and scalp are very common seats of the eruption in infants. At first it appears as an itchy, reddened patch, with a few papules, which are quickly torn, and a raw exuding surface results. This soon becomes covered with crusts, and is torn off by scratching. The surface rapidly increases in size, until a large portion of the face and scalp may be affected. In adults the eruption commonly assumes the erythematous or papular form on the face, or a pustular form upon

hairy parts. Erythematous eczema of the face is very often mistaken for erysipelas or erythema.

Eczema of the eyelids is sometimes a very troublesome affection. The edges of the lids are thickened and red, and the lashes glued together.

Eczema of the lips may exist alone, affecting the skin or the border of the lips. Eczema is rebellious about the mouth, owing to the constant movements of the part. Eczema of the upper lip is often connected with an irritating discharge from the nose.

Eczema of the ears and behind the ears is not uncommon in children; it is also common in adults. When acutely affected, the ears are greatly swollen, hot, and painful; in a chronic state of eczema they are moist, thickened, and itchy. Behind the ear the eruption is very apt to linger for a long time, causing annoying cracks.

Upon the scalp eczema has a pustular, moist, exuding, and dry, scaly appearance.

Pustular eczema is common in young persons, presenting separate pustules, or more often only crusts, which mat the hair together, with a moist surface beneath.

Squamous or scaly eczema exhibits many phases and degrees. Often it is but a later stage of other forms, slowly increasing from a moderate scaling, until what first appears as a mild dandruff becomes annoying in the extreme, by the itching and constant shedding of scales.

Diagnosis.—Eczema of the face may be confounded with erythema, acne, rosacea, and erysipelas; in the beard, with sycosis and barbers' itch (tinen barbæ). Upon the lips it may be mistaken for syphilitic mucous patches, especially at the corners of the mouth, and herpes labialis. It is contagious in the same person by scratching; the patient must not scratch. Mothers and nurses will carry it under their finger-nails to other parts of the body.

Treatment.—Eczema indicates feeble health. It is therefore important that the general rules of hygiene should be enforced, and that a judicious dietary should be prescribed. There are no specifics for the disorder, and consequently each case should be treated according to the general diathesis of the patient, and complicating agencies must be removed or ameliorated wherever possible. In quite a large number of cases, internal remedies are not called for, either because the disease has been evoked by local causes, or because the internal exciting cause has ceased to be operative, and there remain only the effects, which must be removed by local means. In acute vesicular erythematous and papular eczemas, lotions and powders of a soothing and astringent character are most invariably indicated, whereas in subacute forms of the disease, especially where there is much exudation and crusting, ointments of various kinds, such as lead, zinc, and mercury, are more efficacious. In scaly eczema, the tars, in salve forms or in solution, are very valuable. In chronic cases, where the skin is much infiltrated, the object of the treatment is to cause reabsorption of

effused material by such means as potash soap or solution of caustic potash. The most efficient means is the galvanic current of electricity, the positive pole active. Place the positive pole (after first having covered the zinc electrode with eight or ten thicknesses of surgeon's lint) over the thickened surface, the negative pole some distance from the positive. Give as high amperage as can be borne without pain, usually from five to thirty milliamperes, from five to fifteen minutes. This treatment may be given every day for eight or ten days, then every other day until infiltration is absorbed. Sometimes only a few treatments are required.

After each treatment apply the usual remedies. A remedy of almost universal application is:—

℞: Zinci oxidi.....ʒiv
Pulv. calamine præp.....ℨiv
Glycerini.....ʒj
Liq. calcis.....ʒvii

Mix, sig., shake.

Mop on with a rag several times daily; under some circumstances it is better to dip cheese-cloth, cut into suitable strips, in this lotion, and bind them on neatly with a bandage. Black wash, pure or diluted, is of value, and solutions of lead and opium of varying strength.

℞: Opium tincture.....ʒiv
Sugar of lead.....ʒj
Aquæ puræ.....ʒiv

Mop on with a rag several times a day.

Powders are also of considerable efficacy at times:—

℞: Oxide of zinc.....ʒij
Lycopodium.....ʒj

Mix.

Keep the parts powdered.

Or:—

℞: Oleate of zinc.....ʒj
Thymol.....gr. j

Mix.

Keep the part powdered.

Local eczema from the pressure of braces, trusses, splints, etc., may easily be prevented if the underlying surfaces are protected with simple dusting powder. Borated talcum is an efficacious powder. If the skin has become somewhat infiltrated, Lassar's paste will speedily restore it to a normal condition:—

℞: Acidi salicylici.....gr. x
Pulv. Amyli, zinci oxidi, aa.....ʒiij
Vaseline, q. s., add.....ʒj

Mix.

When made properly, this is unequaled as an application for all forms of intertrigo, or chafing; but if illy prepared and gritty, it acts as a direct irritant.

In local patches of eczema, attended by more or less crusting and a degree of infiltration, unguentum vaselini plumbicum is of great value. This is made by melting together equal parts of vaseline and old lead plaster. It should be spread on a strip, or strips, of muslin, and then bound on with a roller bandage; when there is itching, one per cent of carbolic acid may be added to each ounce of the salve.

Tannin ointment is especially suited to the scalp. It should be applied freely and left on.

℞: Tannin 3j
Lanoline 3j

Mix. Apply several times a day.

The part must be very seldom washed; but when washed tar soap should be used, and the ointment re-applied within a few minutes. For the treatment of eczematous ulcer of the legs, there are innumerable remedies. The best will be mentioned. As eczematous ulcers nearly always occur in those affected with varicose veins, it is important to attend to this condition. The most effectual manner of relieving the chronic congestion caused by the dilated or varicose veins, is rest in bed with the limb slightly elevated above the body. The necessity of earning a livelihood often prevents the patient from receiving the benefit of this rest-cure treatment; hence we have to attempt to accomplish the same thing in another way, namely, with the elastic bandage. The bandage may consist of heavy white flannel, or Martin's rubber bandage may be used. The rubber bandage is best; but some prefer the white flannel bandage, as it does not hold the secretions like the rubber bandage. Before applying the rubber bandage, certain precautions are to be observed. The leg must first be dusted with a powder such as has been recommended above for use under trusses. A loose white cotton stocking is then drawn on, and over this the bandage is applied. In using either bandage, two things must be attended to: First, so regulate the tension of the bandage that while it is being applied firmly from the toes to the knee, the pressure gradually diminishes from below upward; second, always apply the bandage before the patient arises in the morning, and remove it only after the patient has retired for the night. Where constant pressure is wanted, it may be necessary to re-apply the bandage at night in bed.

The treatment of the ulcer itself depends on the condition presented. In small, shallow, irritable ulcers, a soothing treatment may be required. For this purpose unguentum vaseline plumbicum, spread on cloth and neatly applied under an elastic bandage, is excellent. In other cases, where the ulcer is deeper, more chronic, and indolent, stimulation is necessary. The ulcer should first be carefully washed with a solution of carbolic acid, and its floor and sides slightly dusted

with iodoform or aristol. The ulcer, and the surrounding skin as well, should then be dressed with unguentum vaseline plumbicum. In case there is a free purulent discharge from the ulcer, it is important to try to secure a more healthy action by careful antiseptic dressing. The leg should first be carefully cleansed with soap and water, and then both ulcer and leg washed with a 1 to 1,000 solution of bichloride of mercury; a dressing—iodoform or bichloride gauze—is then applied, and a crinoline bandage put on. The frequency with which the dressings are made, will be regulated by the amount and character of the discharge; twice a day is usually sufficient. In old ulcers the border often becomes so thickened and so adherent to the deeper tissues as to prevent cicatrization.

Pressure, properly applied, is most efficacious in relieving this condition. A rubber bandage (Martin's) may be applied, or the ulcer may be carefully strapped with surgeon's plaster. At night the rubber bandage may be removed, washed, and aired all night, and in the morning re-applied while the patient is in bed, after the dressing for the night has been removed, and the ulcer and leg cleansed and dressed antiseptically.

Treatment for eczema of the face is difficult, and bears stimulation poorly. During the more acute stages, soothing lotions and ointments are required.

℞: Pulverie calaminæ preparatæ.....3jss
Zinci oxidi.....3j-3ij
Glycerinæ.....3j-3iij
Aquæ rosæ.....℥iv
M. et ft. lotio. Mop on with soft rag.

Another valuable lotion, cooling and antipruritic, is:—

℞: Pulverie calaminæ preparatæ.....3j
Cretæ preparatæ.....3j-3ij
Acidi hydrocyanici diluti.....3ss
Glycerinæ.....3ij-3iv
Liquoris calcis.....℥iij
Aquæ sambuci, ad.....℥viii
M. et ft. lotio.

Sig.: Mop on with a soft rag several times a day.

(Tannin Ointment.)

℞: Acidi tannica.....3j
Unguentum aquæ rosæ.....℥j
M. et ft. unguentum.

Sig.: Wash with tar soap; apply the ointment; wash very seldom; keep ointment applied.

The following is efficacious in an erythematous condition of the face:—

(Diachylon Ointment.)

℞: Zinci oxidi.....3j-3ij
Loquoris plumbi subacetatis dil....3ij
Glycerinæ.....3ij-3iv
Infusi picis liquidæ, ad.....℥iv
M. et ft. lotio.

Sig.: Apply several times a day.

A very soothing ointment for eczema of the face is the following:—

℞: Zinci oxidi.....3j-3jss
Unguenti aquæ rosæ.....℥j
M. et ft. unguentum.

Keep the affected parts anointed.

In eczema of the beard shave daily with Pear's transparent soap, and use continuously an application of a calalamine or diachylon ointment:—

℞: Acidi carbolici.....gr. v to viii
Pulveris calaminæ prep.....3ss-3j
Zinci oxidi.....3ss-3j
Unguenti aquæ rosæ.....℥j
M. et ft. unguentum.

Sig.: Keep continuously applied.

The following ointment is beneficial in chronic eczema of the beard:—

℞: Emplastri diachyli.....℥j
Vaseline.....℥j
M.

Dissolve with heat and stir until cold; keep applied.

In eczema of the hands the eruption is very rebellious, owing to their exposure to air and water, the great motion of the parts, and the difficulty in keeping dressing applied. Acute eczema may exhibit much inflammation and considerable œdema; more commonly the eruption is subacute or chronic, with the repeated production of papules and raw, hard patches, with fissures. On the palms and the soles of the feet chronic eczema presents a stiff, hard surface, reddened or not, with ragged scaling and cracks, usually very painful, combined with itching, which may be distressing. The diagnosis between this and palmer syphilis is often very difficult. As a rule, the eruption of syphilis is more sharply defined than that of eczema, with a decided tendency to clear in the center and to spread peripherally. The margin of the syphilitic eruption is composed of separate elements, papules, or tubercles, and cracks are usually through these; whereas those in eczema may occur anywhere and in any direction through the thickened skin.

Eczema of the arms exhibits the features of eczema elsewhere. At the bend of the elbow it is apt to present evenly reddened surfaces, very itchy, exuding freely when scratched; elsewhere the eruption is usually papular or in patches of reddened and moderately thickened tissue. A very scattered papular eruption of the forearm suggests scabies.

Treatment.—This varies greatly with the condition present; in the more acute form of the eruption, enveloping the hand and arm in a bag containing buckwheat flour is most serviceable. (Bulkley.) Cooling and astringent lotions and ointment are called for.

Dr. J. Hutchinson recommends tar as the best and only remedy to cure eczema. In some cases he recommends a very weak solution in the acute stage, and one a little stronger in the chronic. For a change in some cases, Dr. J. Hutchinson uses acetate of lead lotion first before using the tar lotion.

Dr. A. Van Harlingen recommends lotio migra, or black wash, as one of the best lotions in very acute eczema. This is made, as is known, of calomel and lime water.

℞: Mild chloride of mercury, or calomel..gr. lxiv
Water.....ʒss
Solution of lime-water.....fl.ʒxvi
M. et ft. lotion. Shake well before using.

It may be mopped on with a soft rag, or bits of soft rag may be wet with the lotion and laid over the part. The rags should be allowed to become nearly dry, and then should be wet again. They must not be allowed to dry perfectly before wetting, as they will be apt to stick to the skin, causing pain and irritation when removed. Sometimes dabbing on the black wash for some moments may be followed by some mild ointment, such as oxide of zinc made with pure vaseline, one and a half drams of oxide of zinc to one and a half ounces of pure vaseline. Keep it applied. To remove the ointment from the part when necessary, cleanse with warm water and sulphur soap, dry with a soft rag, apply the lotion for five minutes or more at a time, then put on the ointment, also spread some ointment on a soft rag and lay it over the part. After the eczema begins to pass into the chronic stage, twice a day is often enough to apply the lotion. During the acute stage the lotion should be kept applied through the day, and the ointment put on at night. If the itching annoys the patient during the night, apply the ointment.

In the subacute state an ointment of tar is very serviceable. In chronic forms the compound tincture of green soap is an efficacious stimulant.

℞: Olei cadini,
Saponis veridis,
Spiritus vini rectificati, aa.....ʒj
Mixr. filtra et addi,
Spiritus lavandulæ..... ʒij
M. et ft. lotion.

Use as a stimulant in chronic eczema.

The author has found sulphurous acid diluted a very serviceable lotion in old chronic cases of eczema.

℞: Acid sulphurous.....3ij-3iv
Aquæ.....ʒij to ijss
M. et ft. lotion.

Sig.: Apply it for ten minutes at a time to the affected part, after first having washed the part with sulphur soap. After the lotion has been applied for ten minutes, put on oxide of zinc ointment:—

℞: Zinci oxidi.....3jss
Vaseline.....ʒj
M. et ft. unguentum.

Two to three times is often enough in twenty-four hours to use the lotion; keep the ointment applied.

Eczema of the anus and genital region is most intractable if wrongly treated, and is very curable if managed rightly. The eruption manifests various degrees of severity, from a moderately itchy, sodden condition around the anus to a severely raw, eczematous surface, involving many square inches of this region.

Treatment.—The internal and dietary treatment is of the greatest importance; then with proper local measures the eczema will soon be under control. A weak solution of liquid tar is applied, after the part has been cleansed with tar soap and warm water. Then follow with tar and zinc ointment:—

℞: Unguentum picis liquidæ.....3i to iii
Zinci oxidi.....3i to 1½
Unguenti aquæ rosæ, ad.....ʒj to iss
M. et ft. unguentum.

Use antipruritic, and protectives. (See article on The Rectum.)

INFANTILE ECZEMA.

Eczema may be acute, running its course in a few weeks and then permanently disappearing, or it may be chronic and continuous, or recurring through years. It may occur in small patch, single or multiple, or more rarely covering extensive surfaces. It is never contagious.

Etiology.—The etiology of eczema in children is not understood, especially infantile eczema, which is by no means thoroughly understood. (Bulkley.)

Prof. James C. White, of Boston, draws attention to external factors in the etiology of eczema, which come into play the moment an infant is born into the world. "From its prolonged, placid, subaqueous life it [the infant] emerges into sudden contact with the more stimulating properties of an entirely different element,—the atmospheric ether. For the first time its capillaries dilate to their fullest

extent under the new condition of respiration, and independent and intensified circulation, and spasmodic vocalization. So, too, its glandular systems are called upon to adapt themselves to the strange external surroundings."

"Moreover, at this critical period the infant makes an abrupt acquaintance with the foreign materials of the outer world. Anointed at once with fats, too often with rancid vegetable oils, then rubbed with a chemical compound, more frequently than otherwise composed of impure constituents and so imperfectly combined that an excess of alkali is at liberty to exercise its caustic action upon the susceptible skin; then plunged into water of varying temperature, and briskly rubbed; and finally received in a coarse blanket and dried by friction, it may be with a coarse towel,—such is often the first treatment the skin receives.

"Later the dressing: Around the abdomen is bound tightly a broad flannel band, between its legs are stuffed thick folds of napkin, and about its lower extremities again the rough contact with a woolen petticoat,—all ingeniously adapted to irritate the skin by overheating, pressure, and rude friction. It is not surprising under these circumstances that the skin should resent such irritating surroundings, and should within a few days develop a congestion of greater or less extent, or a mild follicular inflammation which may develop into the more serious and permanent form of eczema."

But other exciting causes are at work. The discharges are often allowed to remain too long unremoved. The irritating fœcal matter and urine, kept in contact with the skin by thick folds of napkin, can scarcely fail to produce the erythematous condition called intertrigo, or chafing, from which to eczema is but a step. Among the poor, neglect in these matters is a common cause of eczema, to which must be added the regurgitation of milk allowed to saturate the clothing about the neck throughout the day and night. Imperfect removal of the smegma at the first washing, and too warm and thick clothing, inducing profuse perspiration, may also be exciting causes of eczema. Eczema affects all classes of society alike; it occurs at all seasons of the year; it comes in children of all degrees of health, in the perfectly sound as well as in the feeble, and, says Professor White, "in equal proportions among bottle babies and those fed at the breast."

Diet.—A hygienic mode of life, together with appropriate aid from medicine, accomplishes for these little ones what local treatment has failed to do.

Keating says: "By no means do I consider eczema a scrofulous disease; but one thing I do feel sure of is that eczema, or at least the predisposition to eczema, is induced by any cause which depraves the general nutrition, and that the various signs which are generally recognized as indicative of scrofulous tendency, go hand in hand with symptoms of impaired nutrition, and point also, when found in connection

with eczema, towards ascertaining a plan of treatment which may be called anti-scrofulous."

Dyspepsia, too, is a predisposing cause of eczema.

Symptoms.—In children under five years of age the eruption of eczema is exhibited in its typical form, as far as the acute, raw, and exuding aspect are concerned. Beginning with a comparatively small amount of papular eruption, the condition may rapidly extend until the entire scalp and face, also the arms, legs, and much of the body, are the seat of a diseased cutaneous action.

The surface of exposed parts is generally covered with crusts, which are frequently torn off, leaving a bleeding and exuding corium; covered parts become more dry, generally adhering to dressings; and when these are forcibly removed, they exhibit a reddened, papular surface, with numerous excoriated points, which sometimes bleed. The itching of infantile eczema is generally frightful, and the little sufferers become frantic in their endeavors to get relief.

Treatment.—In the local treatment of infantile eczema the utmost care must be exercised to avoid overstimulation of the affected parts. Soothing and astringent remedies must be used to give relief. The diet must be carefully directed, and the parts properly protected. Tar and zinc ointment,—unguenti picis liquidæ one to three drams, zinci oxidi half to one dram, unguenti aquæ rosæ ad one ounce, mixed into an ointment,—is a safe and valuable remedy if efficiently applied. Spread on surgeon's lint or a piece of linen, and bind on. This should be removed twice daily, and on exposed surfaces the ointment is re-applied as often as rubbed off, even many times daily, to exclude the air.

Zinc and bismuth ointment, to which a little camphor may be added, is also useful,—zinci oxidi one dram, bismuth subnitrate one dram, unguenti aquæ rosæ one ounce. Mix. Spread on lint, and keep applied.

The following ointment is very soothing and astringent in acute inflammatory conditions:—

℞: Bismuth oxidi..... ʒij
Acidi oleici..... ʒij
Unguenti petrolei..... ʒij + ʒij
Ceræ albæ..... ʒvj
Olei rosæ..... drops vj

Rub up the bismuth, or zinci oxidi, with the oleic acid, and let it stand for two hours; place in a warm-water bath; add the vaseline and wax, and when dissolved stir until cold, and add the oil of roses. Apply on linen or surgeon's lint.

Air and water are highly injurious to eczematous skin, and washing should be avoided; but when it is absolutely necessary, the part should be again instantly and thoroughly protected by ointment, after being very carefully and rapidly dried without friction. Gently touch with a dry, soft cloth, to dry it after washing.

When there is evidently much itching and burning, but no discharge, the following combined powder gives great relief. It should be applied on raw surfaces:—

℞: Pulv. camphoræ..... ℥j
Pulv. amyli,
Pulv. zinci oxidi, aa..... ℥ss

Mix.

These powders may be dusted on, may be rubbed abundantly with the wooly side of a piece of patent lint, and bound upon the skin.

Eczema about the buttocks, genitals, etc., will sometimes bear the application of tarry preparations, especially the tar and sulphur ointment, made as follows:—

℞: Sulphur præcipitat,
Ungt. picis liquidæ, aa..... ℥j
Ung. zinci oxidi..... ℥jss

Mix.

This should be used in small quantities about the genitals.

When the eczema is acute, warm medicated baths are often of the greatest benefit in connection with the other forms of treatment. Two ounces of carbonate of sodium dissolved in about fifteen gallons of water, with a half pint of clear starch stirred through the water, is a good formula.

When the child is taken out of the bath, any appropriate application of those mentioned above, may be used.

Older children suffering from eczema may be treated in the same manner as adults.

The general treatment of infantile eczema, though important, has nothing specific about it. It is directed towards removing all sources of irritation, internal and external, which may excite the inflammation of the skin, and towards improving the general nutrition when this is impaired.

In early infantile eczema, digestive disturbances are very commonly at the bottom of the disease, while in the eczema of older children some fault of nutrition must be combated.

Prognosis.—The prognosis of eczema in children is favorable. Most cases of infantile eczema can be cured in periods varying from a few weeks to months, if the source of irritation can be removed. When the eczema depends upon some general defect of the skin, as ichthyosis, the prognosis must be more guarded. In some cases relapses may occur at intervals during the whole period of childhood to adolescence, in spite of all treatment.

ICHTHYOSIS.

Definition.—Ichthyosis is a disease of the skin, marked by the formation of white masses of epidermis, which peel off like thin paper; or of green, brown, or black masses firmly fixed to the skin and sep-

arated from one another by deep furrows and lines. It affects, usually, the whole integument, is congenital, and of a decidedly chronic character.

Diagnosis.—The thickening of the skin, the large scales with well-marked lines separating them, the wart-like excrescences or ridges, separated by furrows which pass deep down to the corium, are all very characteristic of this disease. Then its chronic and congenital character will also assist in making a diagnosis.

Treatment.—Internal treatment is said to be of little avail. Cod-liver oil has been found of benefit in some cases. The main object of the external management is to soften and get rid of the epidermal masses, and at the same time to make the skin more soft and pliable. An emollient application may be made of lamoline or glycerine, mixed with two or three parts of cold cream. Glycerine may be combined with oleate of bismuth. Equal parts of vaseline and glycerine of starch are recommended.

Durhing recommends the following formula:—

℞: Adipis benzoati.....ʒij
Glycerini.....ℳxl
Ung. petrolei.....ʒss
M.

Sig.: Apply daily after washing with castile soap and warm water.

There is no remedy which will prevent the return of the epidermal masses. The local treatment must, therefore, be repeated as often as it is found necessary.

Prognosis.—Ichthyosis is an incurable disease. As a rule, the health of the patient is not otherwise injured. (J. E. Graham, M. D.) Nor does life seem to be shortened by it. The functions of the internal organs appear, as a rule, to be unaffected by it.

CHAPTER LX.

PARASITIC DISEASES.

TINEA FAVOSA.

Definition.—Tinea favosa is a contagious disease of the skin, due to the presence in the cutaneous structure of the vegetable parasite, the achorion schonleinii. Its usual seat is the scalp, although any part of the integument may be attacked. It is characterized by variously sized, circular, concave, yellow crusts, which are usually pierced by hairs.

Tinea favosa is a dermatomycosis, having its seat in the hair-follicles, the hair, and the epidermis, more especially in the superficial portion immediately beneath the corneous layer.

Diagnosis.—The diagnosis of favus offers ordinarily no difficulty. The yellow color of the crusts, their circular cup-like shape, their friability, and their peculiar musty odor, are usually characteristic. In old cases, and especially in those attended with pus formation, it may be confounded with eczema, but the peculiar crusting, the involving of the hairs, and the presence of more or less baldness, often with atrophy and superficial scarring, will serve to distinguish it from this affection.

Prognosis.—Favus is a curable disease, but the length of time required to effect a cure depends upon the extent of surface involved, and more especially upon the duration of the disease. On the scalp a cure in four to ten months is said to be an average case, and may be considered to be a good result. Recent cases respond much more readily than those in which the disease has been long continued. On non-hairy parts of the integument, favus is usually readily and quickly cured; when affecting the nails, however, it proves obstinate.

Treatment.—This must be energetically carried out if a result is to be expected. The crusts are to be removed by means of oil applications and soap and hot water washing. In cases where the crusts are more or less tenacious, instead of ordinary soap, sapo varidis may be employed with advantage. Subsequently the scalp is to be washed only at intervals of several days, in order that the remedy used may thoroughly soak into the diseased parts. After removal of crusts, parasiticides are to be employed. In those cases in which a great part of the scalp is involved, drawing the hair between the thumb and side of a comb is advisable, the diseased hairs usually coming away with slight traction. The hairs are best extracted by means of forceps or tweezers.

This should be practised each day, and a parasiticide applied immediately afterwards. In all cases the remedy should be applied at least twice daily. The most valuable remedies are corrosive sublimate in the strength of one to four grains to an ounce of alcohol and water; oleate of mercury ointment from ten to twenty per cent; sulphur ointment, citrine ointment, with one to three parts lard; and carbolic acid, one to three drams to the ounce of lard or glycerine. Tar ointment is also valuable.

In conjunction with active treatment of the diseased areas, a saturated solution of boric acid, or a strong carbolic-acid lotion, two to four drams to one pint of water, is to be employed as an application to the whole scalp for the purpose of preventing the spread of the disease. At the end of four to six weeks, treatment should be intermitted for several days, that the effect of the remedial applications may be ascertained. In favus of the nails, the oleate of mercury and corrosive sublimate solutions seem to be the most efficacious. These parts should be kept cut and scraped.

TINEA TRICHOPHYTINA, OR RINGWORM.

Definition.—Ringworm is a contagious disease of the skin, due to the presence of a vegetable parasite, the trichophyton. It varies considerably in its clinical aspects according to its seat and varieties. Tinea circinata, tinea tonsurans, and tinea sycosis demand, for practical purposes, separate descriptions. The last-named variety is obviously confined to adults.

Tinea circinata, or ringworm, is caused by the growth of the fungus in the corneus layers of the epidermis. It is highly contagious, being readily communicable from person to person by direct contact or through the medium of various articles of clothing or of the toilet. It is confined to no age, but is by far most common in children. Sex is without influence.

Diagnosis.—While the diagnosis is quite easy, yet there are certain diseases, more especially eczema, psoriasis, and seborrhœa, which may more or less resemble it. From eczema it is to be distinguished by its circular shape, the sharply-defined margin, the peripheral extension, and the slight degree of inflammation. The circinate patches of psoriasis bear some resemblance, but the marked scaliness and the inflammatory symptoms, together with the presence of ordinary psoriasis spots, will serve to differentiate.

Treatment.—The treatment of ringworm is usually attended with rapid results; it is only in exceptional cases that the disease is obstinate, and this especially in strumous and debilitated patients. The remedy should be applied at least twice daily. If an ointment is employed, it should be rubbed thoroughly in; if a lotion is used, it should be daubed on the patches for several minutes at each application. Hyposulphite of sodium, in solution or in an ointment, a dram to the ounce; corrosive sublimate, one-half to four grains to the ounce, in an ointment or in a

solution; sulphur ointment, full strength or weakened with two parts of lard; ammoniated mercury ointment, full strength or weakened according to the condition of the child, are useful applications. For obstinate cases, paint the patches with collodion containing a dram of chrysarobin to the ounce, or with the tincture of iodine. Infants and young children should always be treated with care. Do not use any harsh remedies, but weaken the solutions and ointments to suit the case. For strumous patients, internal remedies, such as cod-liver oil, iron, and other alternative tonics, are called for.

The nails, when affected, should be kept closely cut and scraped, and one of the above ointments or lotions frequently applied.

Ringworm of the Scalp.—In some cases this disease may exist in the form of disseminated patches, each patch involving a few or a limited number of follicles. In this form, as the scaliness is slight in some cases, and the number of stumps or elevations is small, the disease may readily escape detection unless great care is exercised.

Diagnosis.—The rounded, marginate, scaly plaques, from which many hairs have fallen out, the numerous broken-off hair stumps, the peculiar appearance of the affected part produced by the minute projecting cones of the epidermic scales, are features sufficiently characteristic to prevent error in the diagnosis.

Treatment.—Prognosis as to the ultimate cure is favorable, but it is frequently exceedingly rebellious to treatment. Repeated relapses will occur. In an average case a cure may usually be effected in two to six months.

Frequent application of parasitic remedies should be made to the whole scalp, in order that the spread of the disease may be prevented. For this purpose a saturated solution of boric acid, a two per cent solution of carbolic acid, or a weak lotion of corrosive sublimate, may be employed. The scalp should be washed at intervals of several days, in order that the remedies used may thoroughly permeate or soak into the parts. Cutting the hair closely, while not absolutely necessary, greatly facilitates treatment, and is always advised by all specialists in skin diseases. Depilation of the affected parts should be practised. Though troublesome, this is of great value in expediting the cure, as by the extraction of the hairs, the fungus within the hairs is removed, and the remedy has easier access to the follicles, and is thus brought into contact with the deep-lying fungus. The ointment or lotion chosen should be applied twice a day. Carbolic acid, one or two drams to the ounce of glycerine or ointment, is often satisfactory. The most useful remedy is a lotion of corrosive sublimate, two to five grains to the ounce. Oleate of mercury in the form of an ointment, ten to twenty-five per cent strength, may often be employed with good effect. Sulphur, citrine, tar, and ammoniated mercury ointments, either alone or several combined, are recommended by some writers. Chrysarobin, a dram to the ounce of collodion or gutta-percha solution, or in the form of a rubber plaster, forms an efficient application, and may be used

when the disease is limited to well-defined patches. Occasionally, when the disease is rebellious, remedies such as will excite considerable inflammation in the affected part may be employed. Such remedies, however, are not without danger, and should be employed by the family physician under careful supervision. Croton oil, pure or diluted, with two or three parts of olive-oil, may be used for this purpose, the precaution being observed never to apply it over a large surface at a time. Several such applications may be necessary to produce inflammation sufficient to destroy the fungus. Acetic acid and cantharidal collodion may be similarly employed. Permanent baldness may follow the use of such active remedies, and their employment is to be recommended in rare instances only. After four or six weeks' treatment, all remedies should be suspended for a short time, in order that the exact conditions may again be carefully ascertained. Upon the discovery of scaliness, or broken hairs, or stumps, or the detection of the fungus by microscopic examination, treatment should be resumed, and so on until all traces of the disease have disappeared. Debilitated patients should take cod-liver oil. Wampole's cod-liver oil is very useful because of the iodine it contains.

SCABIES.

Definition.—Scabies, or itch, is a contagious disease of the skin, due to the invasion of an animal parasite, the *Ascarus scabiei.* The presence of the parasite within the cutaneous structure excites varying degrees of irritation, and in consequence the formation of vesicles and pustules, accompanied with more or less intense itching. The eruption is due to the invasion of the itch-mite, and is, therefore, to be found principally in the protected situations, or where the skin is thin and delicate, as between the fingers, on the wrists and forearms, in the folds of the axilla, on the abdomen, on the buttocks, about the genitals, and in the mammary region in the female. In infants and young children, especially in well-advanced cases, the scalp and face may also be involved. Scabies is a local disease, dependent solely upon the presence of the acarus. The prognosis is favorable.

Diagnosis.—The diagnosis in uncomplicated cases is made without difficulty, the burrows, which are pathognomonic, may usually be found upon careful examination. They should be looked for especially between the fingers and on the flexor surface of the wrists. But apart from the presence of the cuniculi, the distribution of the eruption is, as a rule, sufficiently characteristic. An eruption of multiform lesions occurring on the hands and wrists, on the flexor surface of the forearms, in the axillary folds, about the buttocks and genitals, and not unfrequently about the feet and toes, attended with more or less intense itching, and a progressive history, points unmistakably to scabies. It bears most resemblance to vesicular and pustular eczema, and to pediculosis; but as in pediculosis the parasites live in the clothing, necessarily only covered portions of the body show their irritating

effects, and the hands, which are usually the first to be affected in itch, or scabies, and are usually most markedly involved, are entirely free in pediculosis.

Treatment.—The disease is curable. As soon as the acari and their ova are destroyed, the itching and the secondary symptoms rapidly disappear. First, treatment should be preceded by a soap and hot-water bath. Sulphur soap is best for this purpose. Sulphur ointment should be freely applied after the bath. One dram of sulphur to one ounce each of lard and petrolatum, or half an ounce of each to one dram of sulphur. Naphthol, twenty to sixty grains to the ounce, has been highly recommended by Kaposi. Styrax is also a remedy of value, without the irritating effects of sulphur, and may be used in strength of one part to three parts of lard, or pure with two drams of alcohol and one dram of olive-oil to the ounce. In young children and in highly inflammatory cases, use the following:—

℞: Sulphur præcip. ..... ℥j
Balsam peruv ..... ℥j
Adipis ..... ℥j
M. et sig.

It must be thoroughly rubbed into the skin after each bath. The scalp and face, if involved, are to be treated the same as the body. Usually the ascari are readily killed in a few days. The underwear and bed linen are then to be changed. It is better and safer to change the bed linen after each bath, as the child can become reinfected from the unclean bedding. The following remedy has proven very effectual in the writer's hands in the permanent cure of itch:—

℞: Acid sulphuric ..... ℥ij
Spt. turpentine ..... ℥ij
Flour of sulphur ..... ℥iij
Adipis ..... ℥jss

Mix the acid and turpentine together in a plate, and let it stand until effervescing ceases; then add the sulphur and stir until it is thoroughly mixed; then add the lard. The patient must wash with warm water and sulphur soap, dry the affected parts, and put on plenty of the ointment; if it seems to burn too much where the skin is very tender, it may be diluted with a little lard. However, it must burn a little bit in order to kill the itch-mite. This should be well applied night and morning till all signs of the itch have disappeared. The bed linen should be changed daily till the patient is cured, also a fresh gown put on the patient every night.

PEDICULOSIS.

Definition.—Pediculosis, or lousiness, is a contagious affection, due to the presence of animal parasites. There are three varieties, named, according to location, pediculus pubis, pediculus capitis, and pediculus corporis. The pediculus capitis (head louse) is that usually

observed in children; pediculus corporis, or crab louse, lives in clothing; pediculus pubis is rarely met with in children, seated upon the edges of the eyelids and upon the eyebrows.

Diagnosis.—The diagnosis is readily made, as the pediculidæ are usually to be found without difficulty.

Treatment.—The treatment consists in the application of some remedy destructive to the pediculidæ and their ova. Petroleum is one of the most effective remedies at command, one or two thorough applications being usually sufficient. It may be mixed with equal parts of olive-oil to lessen the inflammability of the petroleum. Oil of sassafras one part and olive-oil four parts is a very effective remedy. Tincture of cocculus indicus, pure or diluted, may also be applied with good results. On the following morning after the application of any one of the remedies, the whole scalp should be thoroughly cleansed with soap and hot water. Care must be taken not to allow the petroleum to run over the forehead or down the neck. In order to remove the nits from the hairs, acid or alkaline lotions may be employed, such as dilute acetic acid or vinegar, or solution of carbonate of sodium or borax.

Pediculus corporis (crab-lice) live in the clothing, and are to be found chiefly in the folds and seams, and only exceptionally upon the skin. For their treatment the bedclothing is to be thoroughly baked or boiled, the pediculidæ and ova being in this manner destroyed.

Pediculus pubis is usually seen about the hairy parts of the genitals.

Treatment.—Frequent washing and citrine ointment or ammoniated mercury ointment, weakened with two to four parts of lard, may be carefully used.

CHAPTER LXI.

POISONS AND THEIR ANTIDOTES.

STINGS AND BITES OF INSECTS AND REPTILES; STINGS OF BEES AND WASPS.

Bees, hornets, yellow-jackets, and other wasps produce painful stings. These stings rarely produce any trouble except painful swelling. In some rare instances a bee sting is fatal.

Symptoms.—If general symptoms ensue, they appear rapidly, and consist of great prostration, vomiting, purging, and delirium or unconsciousness. These symptoms may disappear in a short time, or they may end in death from heart failure. Sting of the mouth may cause œdema of the glottis.

Treatment.—To treat a bee sting, extract the sting if it be broken off, and apply locally a solution of washing-soda or bicarbonate of soda, tincture of arnica, spirits of camphor, iodine, or lead-water, and laudanum. If necessary, stimulate with good whisky.

OTHER INSECT BITES AND STINGS.

The bite of a large spider is productive of inflammation, swelling, weakness, and even death. The tarantula is a much-dreaded spider. A scorpion has in its tail a sting, and a scorpion's sting produces great prostration, delirium, vomiting, diaphoresis, vertigo, headache, local swelling and burning pain, followed often by suppuration, or even gangrene and fever.

Treatment.—Tie a fillet about the bitten point; make a crucial incision, favor bleeding, and swab out the wound with pure carbolic acid or some caustic or antiseptic (if in the wilds, burn with fire or gunpowder); dress antiseptically, if possible, and stimulate as constitutional symptoms appear, slowly loosening the ligature.

TARANTULA STING.

Coal-oil is the antidote, provided it can be obtained immediately after the sting; apply locally. It will neutralize the poison, leaving no after-effects.

SNAKE BITES.

The poisonous snakes of America comprise the copperheads, water-moccasins, rattlesnakes, and vipers. There is also a poisonous lizard. The symptoms of snake bite are similar, whether it is the bite of an Indian cobra or of an American rattler, and they depend upon the

dose of poison introduced. Poison injected into a vein may prove almost instantly fatal. In most varieties of snake the teeth lie along the back of the mouth, and are only erected when the reptile strikes. They are hollow, and the poison is deposited by contractions of the muscles of the poison-bag.

Symptoms.—The symptoms are pain, soon becoming intense; matted swelling of the bitten part, which swelling may be enormous, and which is due to œdema and extravasation of blood, and which may assume a purpuric discoloration. There may be complete consciousness, or there may be lethargy, stupor, or coma. Some cases present spasms. The general symptoms are those of profound shock, which may present delirium. Death may arise from paralysis of the heart, and may occur in about five hours, but as a rule it is postponed for a number of hours. If death is deferred many hours, profound sepsis comes upon the scene, with glandular enlargement, suppuration, and sometimes gangrene.

Treatment.—Cases of snake bite must, as a rule, be treated without proper appliances. In general, the rules are to twist several fillets of different levels above the bite, to excise the bitten area, to suck or cup the place bitten, if possible, and to cauterize it by a pure acid or by heat. An expedient among hunters is to cauterize by pouring gunpowder on the excised area and apply a spark, or by laying a hot ember on the wound. When a hot iron is available, use it. The fillets are not to be removed suddenly, and they had best be kept on for some time. Remove the highest constricting band first; if no symptoms come on after a time, remove the next, and so on; if no symptoms appear, reapply the fillet. The constitutional treatment is expressed in one word, stimulate. Our only hope is in large doses of alcohol, and if they can be obtained, ammonia, ether, strychnine, or digitalis hypodermically administered. Morphine may be given for pain. There is no specific for snake bite. Quick excision of the part bitten may often save the patient.

ACIDS,—ACETIC, HYDROCHLORIC, NITRIC, NITRO-MURIATIC, AND SULPHURIC.

Treatment.—Give at once large draughts of water or milk, with chalk, whiting, magnesia, or baking soda; or strong soap-suds may be given to neutralize the acid; olive-oil, white of eggs beaten up with water, and later mucilaginous drinks of flaxseed tea or slippery elm are useful. If in much pain, twenty drops of laudanum may be given.

CARBOLIC ACID, CREOSOTE, RESORCIN.

Treatment.—Promote vomiting with warm drinks containing baking soda, saccharate of lime, and use the stomach-pump after such drinks have been taken; or cause vomiting with mustard, a tablespoonful stirred to a cream with water. Give white of egg beaten up

with water or olive-oil—a cupful. Give stimulants, whisky, etc., freely, and apply warmth and friction to the extremities.

ANTIMONY, COPPER, CROMIUM, IODINEA MERCURY, ZINC, WITH THEIR COMPOUNDS AND PREPARATIONS, CANTHARIDES, COLCHICUM, ELATERIUM, AND CROTON, SAVIN, AND TANSY OILS.

Treatment.—Give white of eggs (half dozen or more, raw) or flour mixed with water. Promote vomiting with water containing baking soda, or cause it with mustard, a tablespoonful stirred to a cream with water, or use a stomach-pump. Give strong tea or coffee, stimulants if needed; if in much pain, twenty drops of laudanum; a demulcent drink of flaxseed or slippery elm.

CAUSTIC ALKALIES, POTASH, SODA, AMMONIA, ETC.

Treatment.—Promote vomiting by large draughts of water. Give vinegar or diluted lemon juice, olive-oil, the whites of eggs beaten up with water, gruel, or demulcent drinks of flaxseed or slippery elm. Twenty drops of laudanum may be given if the patient is in much pain.

ALCOHOL, BENZINE, BENZOL, CAMPHOR, CARBON BISULPHIDE, CHLORAL, CHLOROFORM, ETHER, HYDROCYANIC ACID, ITS COMPOUNDS AND PREPARATIONS.

Treatment.—If necessary, an emetic of mustard, a tablespoonful stirred to a cream with water, must be given. Let the patient have plenty of fresh air, maintaining a horizontal position. Keep the body warm, and try to arouse the patient by ammonia to the nostrils, cold douche to the head, friction and mustard plasters to the limbs, etc. Use artificial respiration. Strychnine for chloral and chloroform (1-30th grain) poisoning.

CANNABIS INDICA, OPIUM, COCOA, THEIR ALKALOIDS, SALTS, AND PREPARATIONS.

Treatment.—Give an emetic of mustard as above, followed by large draughts of warm water, then drink strong tea or coffee. Give rectal injections of capsicum. Arouse the patient, keeping him awake and in motion; use artificial respiration even after life seems extinct. In case of opium poisoning, atropine or tincture of belladonna is the antidote.

ACONITE, DIGITALIS, LOBELIA, TOBACCO, VERATRUM VIRIDE, THEIR ALKALOIDS, SALTS, AND PREPARATIONS.

Treatment.—Give an emetic of mustard as above, followed by large draughts of warm water; give strong tea or coffee, with powdered charcoal, stimulants, whisky, etc., freely; apply warmth to the extremities. Keep the patient in a horizontal position, and use artificial respiration persistently.

BELLADONNA, CALABAR BEAN, CONIUM, GELSEMIUM, HYOSCAMUS, SANTONIN, STRAMONIUM, THEIR ALKALOIDS, SALTS, AND PREPARATIONS.

Treatment.—Give emetics of mustard, followed by large draughts of warm water; give strong tea or coffee with powdered charcoal; stimulants, whisky, etc., if necessary. Arouse the patient, if drowsy; apply heat and friction to the extremities; use artificial respiration.

COCCULUS INDICUS, NUX VOMICA, THEIR ALKALOIDS, SALTS, AND PREPARATIONS.

Treatment.—Give emetics of mustard,—a tablespoonful stirred to a cream with water,—followed by large draughts of warm water. Give powdered charcoal, iodide of starch, or tannin. To relieve spasms, give chloral hydrate—twenty-five grains—in half a teacup of water, or potassium bromide, or inhale pure chloroform. The chloral hydrate may be injected into the rectum if it can not be given by the mouth.

ARSENIC AND ITS COMPOUNDS, COBALT, PARIS GREEN, "ROUGH ON RATS," ETC.

Treatment.—Promote vomiting with warm water, or use stomach-pump, or mustard, as above. Procure at once from a drug store hydrated oxide of iron, and give a teacupful of it; or mix a teaspoonful of calcined magnesia with a cup of water; add three tablespoonfuls of tincture of iron, mix well, and give all of it. Follow with olive-oil or white of eggs, raw, and mucilaginous drinks. Twenty drops of laudanum may be given if there is much pain.

OXALIC ACID.

Treatment.—Give chalk or whiting, a tablespoonful, or even air-slaked lime, a teaspoonful, in fine powder mixed with two tablespoonfuls of vinegar. Do not give soda or potash to neutralize the acid. Promote vomiting by large draughts of water, or with mustard, a tablespoonful stirred to a cream with water. Give olive-oil and mucilaginous drinks, stimulants, whisky, etc., and apply warmth to extremities.

BARIUM AND ITS SALTS, LEAD AND ITS SALTS.

Treatment.—Give Epsom salts, one-half ounce, or Glauber's salts, one ounce, dissolved in a tumbler of water. Promote vomiting with warm mustard water, a tablespoonful of mustard stirred to a cream with water. Give milk, demulcent drinks of flaxseed tea or slippery elm, and laudanum, twenty drops, if there is much pain.

SILVER NITRATE (LUNAR CAUSTIC).

Treatment.—Give common salt, a tablespoonful dissolved in a tumbler of warm water; then an emetic of mustard as above, followed

by large draughts of warm water. Later, arrowroot gruel or demulcent drinks of flaxseed or slippery elm may be given.

PHOSPHORUS COMPOUNDS (RAT PASTE).

Treatment.—Give an emetic of mustard,—a tablespoonful stirred to a cream with water—or, better still, an emetic of blue vitriol, three grains every five minutes until vomiting occurs. Give a teaspoonful of old, thick oil of turpentine; also Epsom salts, one-half ounce in a tumblerful of water. Do *not* give oil, except the turpentine.

DOMESTIC REMEDIES THAT SHOULD BE KEPT ON HAND IN EVERY HOUSEHOLD.

Castor-oil, Castoria, sweet-oil, glycerine, vaseline, linseed-oil, turpentine, improved compound cathartic pills, Epsom or Rochelle salts, triturate of calomel and soda (one-fourth grain Wyeth's or Parke-Davis'), quinine, spirits of camphor, good rye whisky (for emergencies in case of snake bite or heart failure), tincture of ginger or ginger root, paregoric, laudanum (properly labeled), syrup squills, boracic acid (properly labeled), chlorate of potash, bicarbonate of soda, flaxseed meal (to be kept in a closed vessel), mustard, hot-water bag, and fountain syringe.

CHAPTER LXII.

FRACTURES.

Definition.—A fracture is a solution, by sudden force, of continuity in a bone or of a cartilage. A simple fracture is when the bone only is divided. A compound fracture is a division of the bone with a wound of the integuments communicating with the bone—the bone, indeed, generally protruding. In a comminuted fracture the bone is broken into several pieces, and in a complicated fracture there is, in addition to the injury done to the bone, a lesion of some considerable blood-vessel or nerve trunk. Fractures are also termed transverse or oblique, according to their direction.

The treatment of fractures consists, in general, in reducing the fragments when displaced, maintaining them when reduced, preventing the symptoms which may be likely to arise, and combating them when they occur. The reduction of fractures must be effected by extension, counter-extension, and coaptation. The parts are kept in apposition by position, rest, and an appropriate apparatus. The position must vary according to the kind of fracture. Commonly, the fractured limb is placed on a horizontal or slightly inclined plane, in a state of extension, or rather in a middle state between extension and flexion, according to the case.

CAUSES OF FRACTURES.

The causes of fracture are exciting, immediate or direct, and predisposing or indirect.

Exciting Causes.—These are external violence and muscular action.

Immediate Causes.—Direct violence acts upon the bone at the point where it breaks; a blow, the passage of a wheel over the limb, any crushing force, is an instance of this kind. Indirect violence is transmitted through some length of the bony structure, as when the clavicle is broken by a fall on the palm of the hand. Here the mechanism is often plainly leverage, and sometimes a twist also is impressed upon the bone. Muscular action, if sudden and excessive, as in cases of convulsions, may cause fracture.

Predisposing Causes.—Hereditary fragility is a condition commonest among women, it often existing for generation after generation, and in this condition fractures occur from an infinitely slight force. There are some children who seem to have an especial liability to fractures. Their bones are brittle, and give way to very slight forces.

Certain constitutional disorders have been assigned in some of these cases. Syphilis has been regarded as a cause of fragility of the bones. Sometimes there is no assignable cause, the brittleness seeming to be a peculiarity of structure of the bones. Collins[1] and Graham[2] have reported cases of this kind.

Rickets predisposes to fracture because of altered bone structure and the great liability to falls.

Atrophy of bone, as has been seen in old people, is a condition normal in senility. It may arise from want of use, as is observed in the bed-fast, in the wasted femur of hip-joint disease, and in the bones of a stump. It may arise from pressure, as when an aneurism compresses the ribs, sternum, or vertebræ.

Among other pathological and predisposing causes are to be mentioned cancer, sarcoma, and hydatid cysts of bones, caries, necrosis, gout, scrofula, and scurvy.

Symptoms of Fracture.—The history of an injury is to be considered. In spontaneous fracture there may be no record of violence; for instance, when a bone breaks while turning in bed. In investigating the history, not only seek for violence, but determine exactly how the accident happened.

A sound of crepitus, of the grating sensation caused by rubbing the ends of the broken bones together, is a most valuable sign of fracture, and when detected during the examination of a limb supposed to be fractured, the diagnosis is made clear. The patient may have heard the cracking sound. A rupture of a tendon or a ligament produces a similar sound.

Pain is usually, but not invariably, present (absent often in rickets). Malgaigne says that "in some fractures the pain is slight or absent, in others it is torturing, and in most it is severe for a time after the injury but gradually abates unless reinduced by movement. Pain developed at the time of the accident is far less important as a symptom than that which can subsequently be produced by movement. In direct fractures there is an area of pain at the point of application of the force, and another at the seat of fracture. Pain at the seat of fracture can be aggravated infinitely by pressure or movement, and is rather narrowly localized."

Bryant's Diagnosis of Fractures.—"The diagnosis of fractures is usually easy, though in exceptional cases it is difficult, if not impossible. It is easy when, after a blow or fall attended by the sensation of something giving way, deformity is found, with inability to move the limb, and on manipulation abnormal mobility of the injured limb exists, with crepitus from rubbing of the broken fragments together; when pain attends any attempt at movement, and swelling rapidly follows the accident; and when shortening exists, which is remedied by extension.

[1] *British Medical Journal*, May 13, 1882.

[2] *Boston Medical and Surgical Journal*, May 15, 1884.

The diagnosis is difficult when, as in impacted fractures, abnormal mobility and crepitus are absent, and only slight but fixed deformity exists; when local pain and shortening are the only symptoms, and the nature of the accident is the only guide; when a transverse fracture of such a bone as the tibia exists without displacement and with no fracture of the fibula; when the fracture is into, or in the neighborhood of, a joint, and there is much swelling of the injured part, and when a fracture and a dislocation coexist."

When a bone is broken near a joint, and effusion into it follows the injury, the surgeon should suspect the presence of a fissure of the bone into the articulation; and when a V-shaped fracture of the lower third of the tibia is present, the V occupying the internal or subcutaneous surface of the bone, and not the crest, this complication is to be looked for.

When a fracture is transverse, there may be no, or only some slight, lateral displacement; when oblique, there will probably be some shortening of the limb from the drawing up of the lower portion of the limb, or riding, as it is called, of one end over the other. At times there will be a rotation of the limb, and in comminuted fractures separation of the ends of the bone. These points will be greatly determined by the character of the fracture, the bone that is involved, and the amount of muscular action that influences the fracture.

In parallel and conjoined bones, of which only one is broken, the deformity that exists is likely to be less marked than where a single bone is broken; for under these circumstances the non-fractured bone tends to neutralize the action of the muscles through which deformity or contraction usually takes place. Muscular action is undoubtedly the main cause of deformity, tonic action of the muscles existing under all circumstances, and spasmodic action when the muscles are irritated by fragments and attempts at reduction.

Muscular spasms being the main cause of deformity and shortening of the limb after fracture, it becomes an important point to recollect in treatment that the peculiar deformity associated with any special form of fracture can be obviated by neutralizing the action of the muscles that produce it.

When a bone is fissured, and not displaced, the periosteum not being divided, there will be but little displacement; in children this condition is often found.

Crepitus is a most valuable sign of fracture. The crepitus of effusion of tendons must not be mistaken for that of a broken bone. It is a soft crepitus rather than a hard one, as in bone. Bursal crepitation is particularly liable to mislead.

When some swelling follows immediately upon the accident, it means a ruptured blood-vessel, arterial or venous. When it occurs within a few hours, it is due to inflammatory effusion.

In all cases of supposed displacement, the normal condition of the limb must be inquired into, and the sound one compared with the

affected one; for an old acquired deformity in a limb has been mistaken for one caused by an accident, and attempts have been made to restore—or, rather, to reduce—the parts to their supposed normal condition.

Treatment.—The principles of the treatment of fractures are very simple, though the practise is often very difficult. To restore a bone to its normal position and to keep it there by means of surgical appliances, or, as John Hunter expressed it in 1787, "to place the parts in a proper position by art—that is, as near their natural position as possible—and keep them so," are simply rules to be observed, but to carry them out often demands the highest surgical skill and ingenuity; and yet the whole treatment of fractures is really comprised in these two indications.

In examining a fracture the greatest care is requisite, and only sufficient manipulation should be allowed to ascertain the seat of the fracture, the line of its direction, and the tendency a fragment may have to ride in any direction, this special tendency being the one point to be remembered in the treatment. The points, moreover, should be made out at the single examination prior to treatment; for repeated examinations, whether by the responsible surgeon or by his assistant, are to be condemned, as they can only do mischief by exciting more local irritation and adding to the injury which the muscles and soft parts have already sustained. For this reason, when, after an accident a fracture is suspected to have taken place, the surgeon or bystander should do no more than bind the limb to some immovable apparatus, such as a wisp of straw, a bundle of sticks, or two pieces of wood fixed by a handkerchief till the sufferer has been carried home and placed in the position in which he is to be treated. When the lower extremity is the affected part, the injured limb may be bound to the sound one, the latter acting as a splint.

In compound fracture the same precautions are necessary. Bleeding should be arrested by the application over the wound of a pad, or bandage, kept in position by means of pressure and the elevation of the limb, while in more severe cases the tourniquet or some local pressure over the main artery may be called for.

When a patient is placed in bed where he is to be treated, the fracture ought to be manipulated, and its position, nature, and peculiar tendency made out; and when made out, it is to be "set," or put up at once. The only exception to this rule is when time has been allowed to pass before treatment is commenced, and much œdema or swelling of the injured extremity exists; then it is better to fix the injured limb raised upon a pillow with a long sand-bag on either side to act as a splint, and possibly a third around the foot, the pillow and side sand-bags being firmly bound together by a strip of bandage, the whole forming an immovable apparatus, and letting it remain for the first month or five weeks till the limb could be put up in some starch or an immovable apparatus, and the patient allowed to get up.

In "setting" a fracture some care is needed, and the opposite and corresponding limb should always be before the surgeon as a guide. In extending a broken limb to restore the bones to their normal position, the upper portion should be firmly held by an assistant, to make counter-extension, and the muscles attached to it are relaxed by placing the limb in a slightly flexed position; a second assistant or the surgeon may then extend the fractured end, while the latter gently manipulates the fracture to make out its points. The extension should be steady, free from all jerks and violent movements, gentle lateral, rotary, or other movements being given as required to restore the displaced position of bone, the pressure of the thumb or finger being freely used to bring about an accurate coaptation, or setting of the fragments, for the surgeon must remember that muscular contraction is better overcome by continued extension than by temporary force, and that for the treatment of fractures generally, moderate extension continuously applied is preferable to forcible extension in any of its forms. The inhalation of chloroform at times is a valuable aid in the reduction of a fracture. If, when the fractured bones have been reduced, muscular spasms are so severe as to render it impossible to keep them in situ—a condition which is not uncommon in fractures of the leg—the tendon of the offending muscle may be divided. In otherwise intractable fracture of the leg there is no operation of greater value and attended with less evil than the division of the tendo Achillis. In a general way, however, the muscular spasms cease after the first three or four days. (Bryant.)

When the fracture has been reduced and by manipulation coaptated, or "set," splints or other mechanical appliances are necessary to keep the bones in their normal position, and the simpler these appliances are, the better, so long as they fulfil their purpose. These splints should always be well padded, and the pads so adjusted as to fit into the inequalities of the limb and protect it from any local pressure. They should be firmly and immovably fixed to protect the limb by inelastic straps or bandages, and the seat of fracture, as a rule, should be left exposed for the surgeon's examination, in order that the fracture may be readjusted if displacement takes place. To cover up a broken bone by bandages or splints is a mistake. The position of the bone during the progress of repair should always be open to view, the former practise being based on hope, the latter on certainty. Pott's rule, that the splints include the joint above as well as below the fracture, is sound, though, it is said, it can not always be followed. Every joint, however, should be fixed when by its action the broken bone is rendered movable.

When one bone is broken in a limb where double bones exist, the second acts as a splint and keeps up extension. Under these circumstances a simpler apparatus is required to keep the fractured bone quiet and retain the action of the muscles that move, than under other circumstances.

Extension is a valuable and necessary adjunct to other treatment, and should be kept up by means of weights, pulleys, or such other appliances as the ingenuity of the surgeon may suggest.

After the setting of the fracture, the essential point to be observed in its treatment is the immobility of the broken bone; and next to this, its exposure to observation during the progress of repair, to render certain that the bone has maintained its right position.

Treatment of Compound Fracture.—The treatment of compound is similar to that of simple fractures, plus the treatment of the wound, with its complications and the broken fragments or projecting portions of bone; but "rest" of the bone is the great object we have to aim at.

The fractures should be "set" in the same way as the simple, great care being observed in the manipulation that the soft parts are not more injured. Loose fragments of broken bone must be taken away, projecting portions excised, and the bone reduced, the wound being enlarged when necessary to facilitate this act. The injured parts, too, ought to be thoroughly cleansed and all wounded vessels twisted or ligated; the bones should then be fixed immovably by means of splints, interrupted splints often being required.

When the wound is not very extensive, it should be sealed by means of a piece of lint saturated with blood, or, what is better, with the compound tincture of benzoin. If the carbolic-acid dressing is employed, the wound should be well washed with a weak solution of one part in a hundred of sterilized water and dressed under the spray. The wound should be interfered with as little as possible, since now, as when the following words were uttered, "the great mischief and bad success arising in the treatment of compound fractures is the dressing them every day and applying fresh poultices, which necessarily moves the ends of the bones. The limb, if possible, should never be moved. When the soft parts are much crushed and the large vessels and nerves injured, amputation may be called for, more particularly in old subjects."

FRACTURE OF THE CLAVICLE.

"The causes of clavicle fractures are direct violence, indirect violence, and, very rarely, the contractions of the deltoid and clavicular fibers of the great pectoral muscle."

Symptoms.—In fractures of the shaft, the attitude of the patient is peculiar. The patient supports the elbow or wrist of the injured side with the hand of the sound side and also pulls the extremity against the chest; the head is turned down towards the shoulder of the damaged side as if trying to listen to something in the joint, thus relaxing the pull of the sterno-cleido-mastoid muscle upon the inner fragment. The shoulder is nearer the sternum on a lower level, and farther front than that of the sound side. Loss of function is shown by inability to abduct the arm. Considerable pain exists, which is increased by motion, by pressure, and by the extremity hanging down without support.

Treatment.—In treating fracture of the shaft, reduce the fracture as soon as possible by throwing the shoulder upward, outward, and backward. If the patient is a girl, it is desirable to minimize the deformity. Place her in the recumbent position on her back on a hard bed, with a small pillow under her head, a firm and narrow cushion between the shoulders, a bag of shot resting over the seat of fracture, and the forearm lying on the front of the chest, the arm being held to the side by a sand-bag. The recumbent position may be maintained for about three weeks, till union has fairly taken place, but men and children will rarely be found willing to follow such a line of treatment; and, happily, it is not required, for nearly, if not quite, equally good results will be secured by imitating what takes place on the assuming of the recumbent position, viz., by fixing the lower blade of the scapula to the chest, binding down its angle to the thorax, and preventing the tilting forward and rotation of the bone through which the deformity takes place. In a child with an incomplete fracture, a handkerchief sling for the forearm, worn three weeks, is all that is needed.

In complete fracture, the Velpean bandage is efficient. Before applying it, place lint around the chest and cotton over the elbow. Change the bandage every day for the first week, and after that period, every third day. Each time it is changed, rub the skin with alcohol, ethereal soap or soap liniment; then dry it, and examine for excoriations, which, if any are found, are to be anointed with zinc ointment before the dressing is reapplied. The dressing is permanently removed at the end of four weeks, the arm being worn in a sling for another week.

FRACTURES OF THE UPPER EXTREMITY.

These include fracture of the anatomical neck of the humerus, fracture of the surgical neck, and fracture of the head, oblique and longitudinal.

Symptoms.—The symptoms in fracture of the anatomical neck are pain, swelling, ecchymosis, slight irregularity of the shoulder, and inability to abduct the arm voluntarily. Deformity, as a rule, is slight or is absent, because the capsule is rarely entirely torn from the lower fragment. Cases of this kind, though rare, do occur, especially in the aged.

Treatment.—The nature of the accident having been ascertained, and the question of impaction decided, the treatment becomes simple. In a non-impacted fracture the first aim is to bring the bones into as good apposition as possible, and to keep them there by means of splints and position. Flex the arm to a right angle with the body, and carry up from the base of the fingers to above the elbow the turns of a spiral reverse bandage. Interpose lint between the arm and the side, and place a folded towel or a small pad in the axilla, tying the tapes over the opposite shoulder. Mould a shoulder cap upon the outer aspect of the arm and upon the shoulder. This cap, which is made

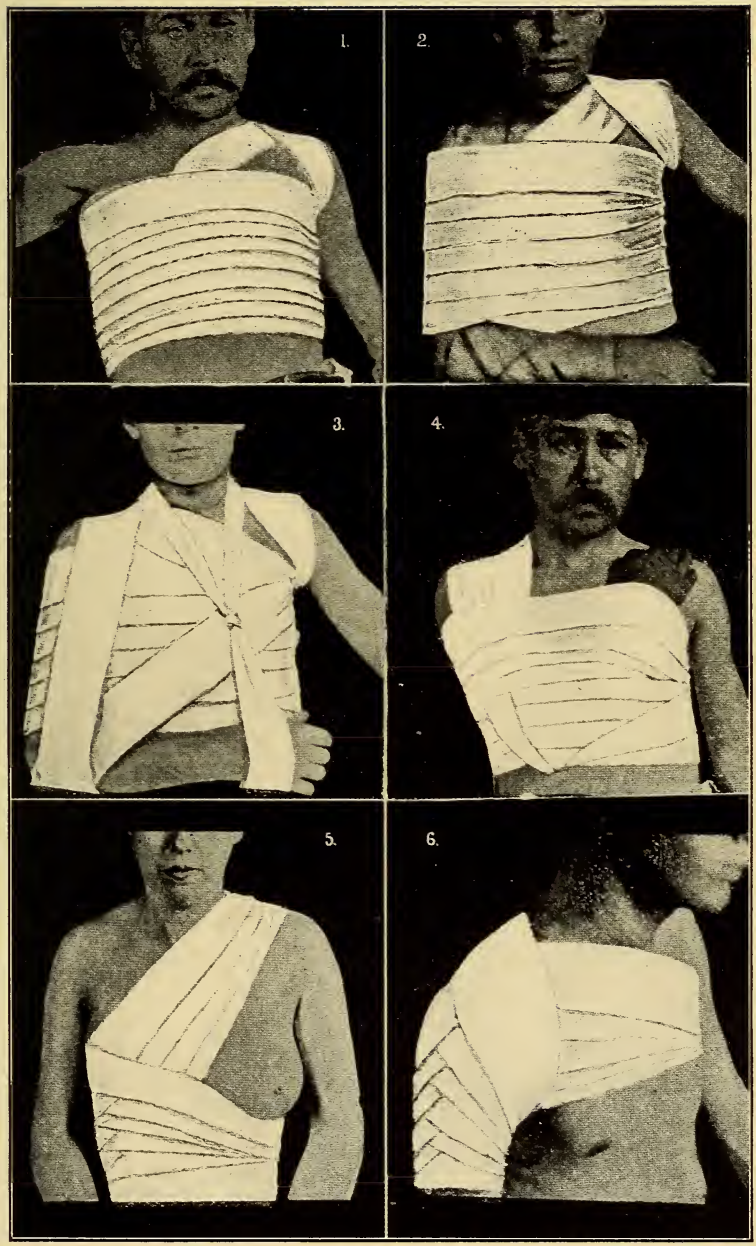

Plate c.—1–3, Desault's Bandage: 1, First Roller; 2, Second Roller; 3, Third Roller; 4, Velpeau's Bandage; 5, Figure-of-8 Bandage of the Breast; 6, Spica of the Shoulder.

of pasteboard or of felt, should reach below the insertion of the deltoid muscle, covering one-half the circumference of the arm, and is to be padded with cotton. The arm with the shoulder-cap is fixed to the side by the second roller (of Desault, two and a half inches wide and seven yards long), and the hand is hung in a sling. The endges of the bandage had best be stitched. The apparatus is changed daily for the first few days, the body and arm being rubbed at each change with alcohol, soap liniment, or ethereal soap. After this period, a change every third or fourth day is often enough. Passive motion is started at the end of four weeks, and the dressings are removed at the end of six weeks. In impacted fracture do not pull apart the impaction, but apply a cap to the shoulder, and fix the arm to the side for five weeks. No pad is used. The fracture unites in deformity. (Bryant.)

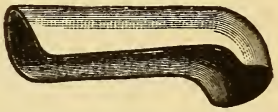

Fig. 32.—Shoulder Cap.

FRACTURES OF THE SURGICAL NECK OF THE HUMERUS.

The surgical neck is the constricted portion of bone between the tuberosities and the upper line of the insertion of the muscles on the bicipital groove. Fractures in this region are usually transverse, but they may be oblique. The causes are almost always direct force.

Symptoms.—Pain running into the fingers from pressure upon the brachial plexus; crepitus and mobility on extension; and flattening, which differs from the flattening of dislocation, in that it occurs farther below the acromion, and that this process is not so prominent. Shortening to the extent of an inch is noted. The lower fragment is drawn inwards towards the chest, while the upper fragment is drawn upwards and outward by the muscles that are inserted into the tuberosities. The bone projects forward or backward, according to the direction of the fracture. The more oblique the line of fracture, the greater the deformity.

Treatment.—The same treatment is applicable in fracture of the surgical neck of the humerus as in fracture of the anatomical neck. The aim should be to keep the impacted bones in position, and to prevent their being loosened, so that natural processes may effect a cure in a month or six weeks, with a limited degree of deformity.

FRACTURES OF THE SHAFT OF THE HUMERUS.

These are common, and more readily made out, as well as more successfully treated, than any other fracture. When oblique, they are frequently followed by some degree of shortening. When the fracture is transverse, there is no displacement. Loss of power in the arm, mobility of the bone, crepitus, local pain, and deformity, are ample symptoms to indicate the accident.

Treatment.—In the primary treatment of all fractures of the arm, it is a wise and scientific practise to keep the forearm at rest, which is best done by the application of some angular splint extending from the shoulder or axilla to the wrist, associating with it a posterior or anterior short splint, reaching from the shoulder to the elbow. After about two or three weeks, the angular splint may be removed, and some immovable one applied, the forearm being left free.

Any splints that secure immobility of the broken bone after its ends have been coaptated by manipulation, must be regarded as beneficial, and no splints can do this effectually that allow freedom of movement of the forearm. When two lateral splints appear the better adapted to keep the bones in position, they must be angular, to include the elbow, and bent at a right angle. Splints are to be worn six weeks. Passive movements are not to be made until the fracture is well united (after six weeks); for if made too soon, they predispose to non-union, and as no joint is involved, ankylosis will not occur.

FRACTURE OF THE SHAFT OF THE ULNA.

This is most apt to be near the middle, and is always due to direct violence. In these cases there is, as a rule, little displacement, and when it exists, it is of the lower fragment. On manipulation, crepitus is usually present, with local pain. Fracture of the Olecranon process is a very frequent accident from a fall or blow upon the elbow, or a sudden action of the triceps. In fracture of the shaft of the ulna, the long axis of the hand is not in a line with the long axis of the forearm, but is internal to it. The forearm at and below the seat of fracture is narrower and thicker than normal.

Treatment.—In treating fracture of the shaft, place the forearm midway between pronation and supination, so as to bring the fragments together, and to obtain the widest possible interosseous space. This limits the danger of ankylosis in this space. The surgeon has only to see that the broken bone is kept quiet by means of two well-padded, straight splints, one long enough to reach from the inner condyle to below the fingers, the other from the outer condyle to below the wrist; place a long pad over the interosseous space on the flexor side of the limb, and another on the extensor side; apply the splints, and hang the arm in a triangular sling (Fig. 1, plate f). Passive motion is to be made in the third week, and the splints are to be worn for four weeks.

FRACTURE OF THE SHAFT OF THE RADIUS.

In all fractures of the radius it is essential to keep the hand at rest, and as a consequence, all splints should, at the least, extend down to the base of the fingers.

Symptoms.—The upper fragment is drawn forward by the biceps, and is fully supinated by the supinator-brevis muscle. The lower

fragment is fully pronated by the pronator-quadratus and pronator-radii-teres muscles, and its upper end is pulled into the interosseous space. There are crepitus, mobility, pain, narrowing and thickening of the forearm below the seat of fracture, and loss of the power of pronation and supination. The head of the bone is motionless during these movements, and the hand is prone.

Treatment.—In treating this fracture, Da Costa's advice is: "Do not put the forearm midway between pronation and supination, as this position will not bring the fragments into contact, the upper fragment remaining flexed and supinated. To bring the lower fragment in contact with the upper, flex, and fully supinate the forearm. Put the arm upon an anterior angular splint for four weeks (Fig. 3, plate f), and make passive motion in the third week.

"In treating fractures below pronator radii teres, the forearm is flexed, and is placed midway between pronation and supination; interosseous pads and two straight splints are applied as for fracture of the ulna. The splints are worn for four weeks, and passive motion is made in the third week."

FRACTURE OF THE SHAFTS OF BOTH BONES OF THE FOREARM.

This is not frequently seen. It is caused by direct or indirect force.

Symptoms.—In fracture of both bones of the forearm, the hand is pronated, and the two lower fragments come together and are drawn upwards and backwards or upward and forward by the combined force of flexor and extensor muscles, shortening being manifest, and a projection being detected on either the dorsal or the flexor surface of the forearm.

Treatment.—Bryant states that under all circumstances the forearm should be flexed, and the hand kept in the semi-prone position. Two wide splints should be employed, well padded, broad, and coming down to the roots of the fingers, the surgeon so arranging his pads as to prevent deformity and to neutralize the peculiar tendency of the fracture. When the parts are bandaged too tightly, the bones may be pressed together, and consolidation takes place as a whole, with consequent loss of motion, or the two bones may be braced together by some bony isthmus. Under all circumstances the fracture should be put up with the hand supinated, the dorsal splint being first applied, and then the palmar, the forearm being semiflexed. When fracture of the radius and ulna takes place above the wrist joint, the symptoms may simulate those of dislocation; but the greater mobility of the lower ends of the bones, crepitus, and local pain ought to forbid the error being acted upon.

FRACTURES OF THE CARPAL AND METACARPAL BONES.

Fractures of this kind can occur only from direct violence, some crushing force being the usual form. One or more bones may be broken. The first metacarpal bone is oftenest broken.

Symptoms.—The signs of a metacarpal fracture are dorsal projection of the upper end of the lower fragment, the head of the bone being felt in the palm, with pain, crepitus, and often evidences of direct violence.

Treatment.—The treatment for a fracture of the carpal bones should be such as will serve for all; for the application of an anterior splint, as well as cold lotions and absolute rest of the injured part, ought always to be observed in all clear cases, as also in those that are doubtful, and with these a good result may generally be secured. All splints must be well padded.

To treat a fracture of the metacarpal bones, reduce by extension; place a large ball of oakum, cotton, or lint in the palm to maintain the natural rotundity, and apply a straight palmar splint, well padded (see Fig. 33), like that used in the fracture of the carpus. It may be necessary to apply a compress over the dorsal projection. The duration of treatment is three weeks, and passive motion is begun after two weeks.

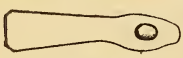

Fig. 33.

Many compound comminuted fractures of the carpus require amputation. In an ordinary compound fracture, ascepticize, drain, dress with antiseptic gauze and a plaster-of-Paris bandage, cutting trap-doors in the plaster over the ends of the drainage-tube. In a simple fracture, use lead-water and laudanum for a few days.

Symptoms and Cause of Fracture of the Phalanges.—The phalanges are often broken. The fracture may be compound. The cause usually is direct force. The fracture is characterized by pain, bruising, crepitus, and mobility, with very little or no displacement.

Treatment.—If the middle or distal phalanx is broken, mould on a trough-like splint of pasteboard or gutta-percha, which splint need not run into the palm. If the proximal phalanx is broken, run the splint into the palm of the hand. Make the splint of gutta-percha, pasteboard, wood, or leather. The splint is worn three weeks. A sling must be worn to prevent the finger from being knocked and hurt. Some cases require a dorsal as well as a palmar splint.

FRACTURE OF THE FEMUR.

This is a very common injury. The divisions of the femur are: First, the upper extremity; second, the shaft, and, third, the lower extremity.

When the fracture involves the neck near the head of the bone, it is called intracapsular; when the base of the neck near the trochanters, extracapsular; but in these the joint is generally involved, the line of fracture, as a rule, being oblique from the neck within to the base of the neck without the capsule. Both forms may be impacted. The former is so frequently; the latter, generally.

In the fracture of the neck near the head of the bone, the neck of the bone is usually driven into the head. In the fracture of the base of the neck, the neck is, as a rule, driven into the shaft.

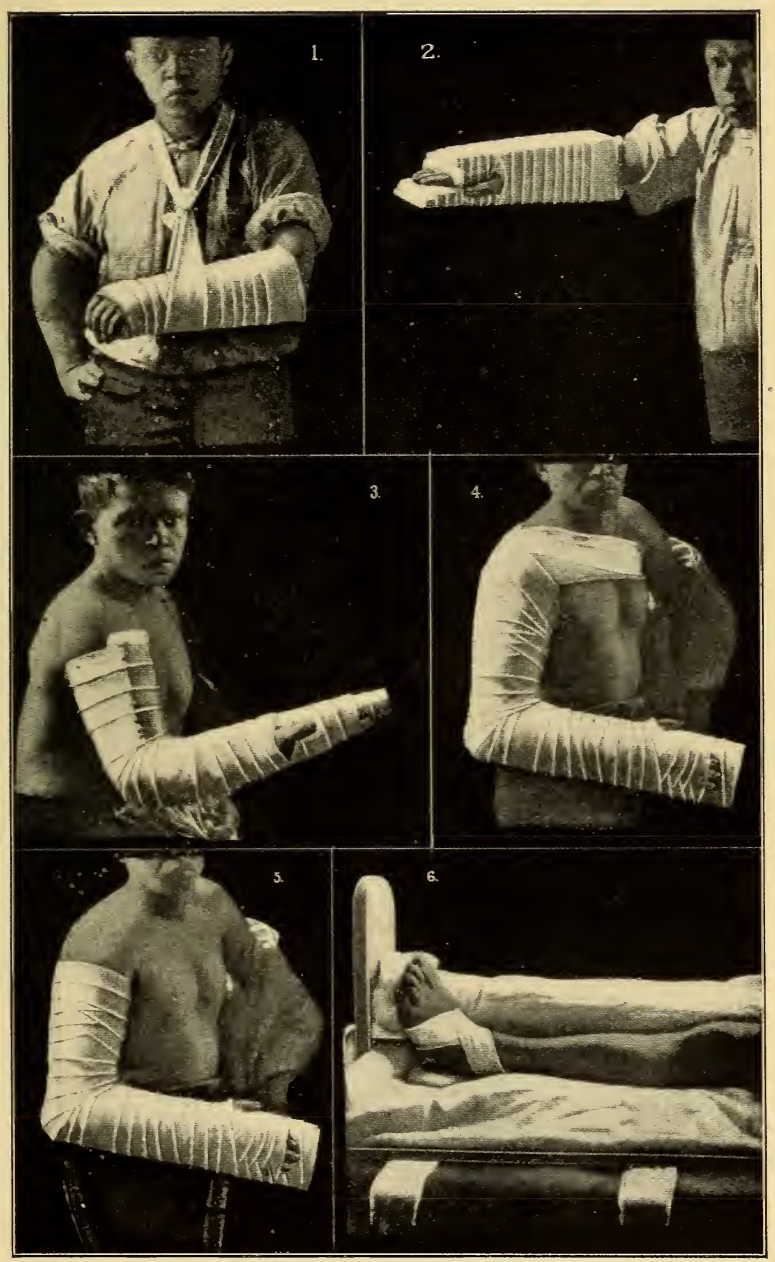

Plate f.—1, Bond's Splint in Colle's Fracture; 2, Two Straight Splints in Fractures of Both Bones of the Forearm; 3, Anterior Angular Splint in Fractures in or near the Elbow-joint; 4, Internal Angular Splint and Shoulder-cap in Fracture of the Surgical Neck of the Humerus; 5, Internal Angular Splint in Fracture of the Shaft of the Humerus; 6, Fracture-box in Fractures of the Bones of the Leg.

Fractures of the narrow part of the neck of the femur are generally caused by indirect violence, such as tripping in the carpet; fracture of the base of the neck, by direct violence, such as a fall upon the trochanter. When the posterior ridge of bone penetrates the trochanter, there will be eversion of the foot, the outer surface of the trochanter looking backward, and the anterior surface of the neck will be felt as a prominent projection beneath the rectus muscle. When the anterior ridge of bone penetrates the lower fragment, the foot will be straight or inverted, the surface of the trochanter will look outward, and a great fulness will be felt behind the trochanter. Should the limb be much adducted when the patient falls upon the trochanter, the lower border of the neck may be driven into the trochanter; and should the limb be much abducted when the fall takes place, the fracture will probably be in the narrower part of the neck, and therefore unimpacted and intracapsular. When the penetration of the neck is great, the trochanter will be broken off, and there will be no impaction, but the usual unimpacted fracture of the neck. (Bryant.)

SYMPTOMS OF INTRACAPSULAR FRACTURE OF THE FEMUR.

There is usually shortening to the extent of from half an inch to an inch. Shortening of a quarter of an inch does not count in diagnosis, for, as Hunt shows, one limb is often naturally a little shorter than the other. If the reflected portion of the capsule is not torn, the shortening is trivial in amount or is entirely absent. In some cases shortening gradually or suddenly increases some little time after the accident. This is due to separation of an impaction, tearing of the previously unlacerated capsular reflection, restoration of muscular strength after a paresis, or absorption of the head of the bone. Shortening is due chiefly to pulling up of the lower fragments by the hamstrings, the glutei, and the rectus muscles.

Eversion exists, spoken of as "helpless eversion," though in a very few instances the patient can still invert the leg. This eversion is due to the force of gravity, the limb rolling outward because the line of gravity has moved externally. That eversion is not due to the action of the external rotator muscles, as was taught by Astley Cooper, is proved by the fact that when a fracture happens in the shaft below the insertion of these muscles, the lower fragment still rotates outwards. In some unusual cases inversion attends the fracture. Besides shortening and eversion, the leg is somewhat flexed on the thigh, and the thigh on the pelvis, the extremity, when rolled out, resting upon its outer surface. Loss of power is a prominent symptom. The limb can rarely be raised or inverted. Pain is trivial except upon motion, when it can be localized in the joint. Crepitus often can not be found, either because the fragments can not be approximated or because they are greatly softened by fatty change. To obtain crepitus the front of the joint must be examined while the limb is extended and

rotated inward. The diagnosis is readily made without it. In many cases it can not be found, and the endeavor to obtain it inflicts pain, and may effect damage. These fractures offer a not very flattering chance of repair, and efforts to find crepitus may injure the capsule or pull apart an impaction. (Allis.)

The altered arc of rotation of the great trochanter is Desault's sign. The pivot on which the great trochanter revolves is no longer the acetabulum, and the great trochanter no longer describes the segment of a circle, but it rotates only as the apex of the femur, which rotates around its own axis.

Relaxation of the fascia lata (Allis' sign) simply means shortening. The fascia lata (the ilio-tibial band) is attached to the ilium and the tibia, and when shortening brings the tibia nearer to the ilium, this band relaxes, and permits one to push more deeply inward on the injured side, between the great trochanter and the iliac crest, than on the sound side.

The ascent of the great trochanter above Nelaton's line is another test. This line is taken from the anterior superior iliac spine to the most prominent part of the ischial tuberosity (Fig. 34). In health the great trochanter is below, and in intracapsular fracture it is above this line.

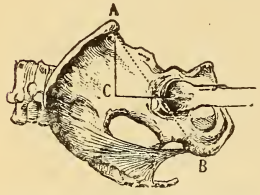

Fig. 34.—ACD Bryant's Ilio-femoral Triangle. AB, Nealton's Line. (Owen.)

To test the ascent of the trochanter into Bryant triangle (Fig. 34), place the patient in a recumbent position; carry a line around the body on a level with the anterior superior spines; lay down Nelaton's line, and measure the base of the triangle from the great trochanter to the perpendicular line from the spine to determine the amount of ascent.

Morris' measurement shows the extent of inward displacement. Measure from the median line of the body to a perpendicular line drawn through the trochanter on each side of the body.

Diagnosis of Intracapsular Fracture.—When, from the direction of the force applied to the trochanter, the posterior wall of the neck is driven into the intertrochanteric line, the limb will be rotated outward, and the foot inverted; and when the anterior wall is driven into the bone, there will be inversion of the limb. The former form of accident is far more common than the latter, on account of the greater thinness of the posterior wall. Intracapsular fracture may be confused with extracapsular fracture or with a dislocation of the hip-joint. Extracapsular fracture, which is commonest in young adults, results from direct violence over the great trochanter. If non-impacted, there are noted shortening of from one and a half to over three inches, crepitus over the great trochanter, and usually, but not invariably, eversion; if impacted, there is less eversion; crepitus is almost or entirely absent, and the shortening is limited to about an

inch. Great tenderness exists over the great trochanter, in both impacted and non-impacted fractures. In dislocation on the dorsum of the ilium, the patient is usually a strong young adult. There are inversion (the ball of the great toe resting on the instep of the sound foot), rigidity, ascent of the bone above Nealton's line, and shortening of from one to three inches. In dislocation into the thyroid notch, there is possible eversion, but it is linked with lengthening.

Prognosis.—The prognosis is not very favorable. Old people not unusually die. In impacted fracture, bony union may occur; in non-impacted fracture fibrous union is the best that can be expected. Non-union is not unusual. Permanent shortening to some degree is inevitable, and the function of the joint is sure to be more or less impaired. It will be found necessary in many cases for the patient always to employ support in walking.

Treatment.—In treating a very old or feeble person for intracapsular fracture, make no attempt to obtain union. Keep the patient in bed for two weeks; give lateral support by sand-bags; tie around the ankle a fillet, to which attach a weight of a few pounds, and hang the

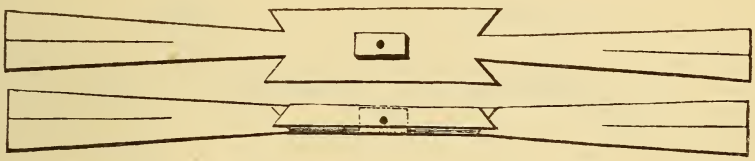

Fig. 35.—Adhesive Strips for Extension Apparatus.

weight over the foot-board of the bed. When pain and tenderness abate, order the patient to get into a reclining chair, and permit him very soon to get about on crutches. If hypostatic congestion of the lungs sets in, if bed-sores appear, if the appetite and digestion utterly fail, or if diarrhea persists, abandon attempts at cure in any case, and secure for the sufferer sunshine and fresh air. Immobilize the fracture as thoroughly as possible by means of pasteboard splints. If it is determined to treat the case, combine extension with lateral support by means of sand-bags and the extension apparatus originally devised by Gurdon Buck. Place the subject on a firm mattress, and if the patient be a man, shave the leg. Cut a foot-piece out of a cigar-box; perforate it for a cord; wrap it with adhesive plaster, run the weight-cord through the opening in the wood, and fasten a piece of plaster on each side of the leg, from just below the seat of fracture to above the malleolus. The plaster is guarded from sticking to the malleoli by having another piece stuck to it at each of these points. Apply an ascending spiral reverse bandage over the plaster to the groin (see Fig. 36), and finish the bandage by a spica of the groin. Slightly abduct the extremity. Put a brick under each leg of the bed at its

foot, thus obtaining counter-extension by the weight of the body. Run a cord over a pulley at the foot of the bed, and get extension by the use of weights, such as shot, fine rocks, or brick. From ten to fifteen pounds will probably be necessary at first, but after a day or two from six to eight pounds will be found sufficient (remember that a brick weighs about five pounds). Make a bird's-nest pad of oakum for the heel. Take two canvas bags, one long enough to reach from the crest of the toe to the malleolus, the other long enough to reach from the perineum to the malleolus. Fill the bags three-quarters full of dry sand, sew up their ends, cover the bags with slips, and put them in place in order to correct eversion. The slips may be changed every third or fourth day. The bowels are to be emptied, and the urine is to be voided into a bed-pan, unless using a fracture bed. Maintain extension for five or six weeks. Then mould pasteboard splints upon the part, and keep the patient in bed for three or four weeks more. In from eight to ten weeks after the accident, the patient may get about on crutches. Union, if it takes place, is cartilaginous, and not

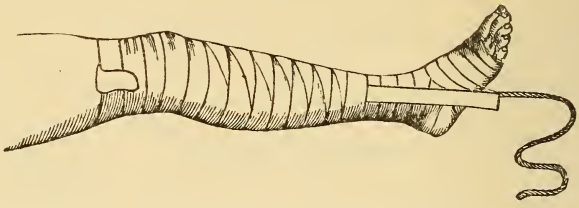

Fig 36.—Adhesive Plaster Applied to Extension.

bony, and there is bound to be some shortening and some stiffness of the joint. Passive motion is not made until after eight weeks have elapsed. Professor Senn claims that by his method of "immediate reduction and permanent fixation," bony union is obtained in fracture of the neck of the femur within the capsule. He "places the patient in the erect position, causing him to stand with his sound leg upon a stool or a box about two feet in height. In this position he is supported by a person on each side until the dressing has been applied and the plaster has set."

EXTRACAPSULAR FRACTURE.

The line of extracapsular fracture is at the junction of the neck with the great trochanter, and is partly within and partly without the capsule, the fracture being generally comminuted and often impacted. The cause is violent force. This fracture is most usual in strong young adults.

Symptoms.—When impaction is absent, there is marked crepitus, which is manifested most when the fingers are put over the great trochanter. There are great pain, swelling, and ecchymosis. There is absolute inability on the part of the patient to move the limb, and

passive movements cause great pain. There is shortening to the extent of at least one and a half inches, and often three inches; and there is absolute eversion with slight flexion of both the legs and the thigh. All these symptoms follow violent direct lateral force. In impacted forms of extracapsular fracture, in addition to the aid given the surgeon by the history, there is severe pain, which is intensified by movement or pressure. Shortening exists to the extent of one inch at least, which is not corrected by extension. There is also great loss of function, and whereas the limb may be straight or even inverted, it is usually everted. Crepitus can not be obtained without improper violence, and the trochanter moves in a large arc of rotation, although it is in Bryant's triangle and above Nelaton's line.

Treatment.—In treating extracapsular fracture, make extension, raise the foot of the bed, apply the extension apparatus with sandbags for four weeks; then apply a plaster dressing, and get the patient up on crutches. Remove the plaster at the end of four weeks. In impacted fracture, use a moderate force in extending, but never violently pull the bones apart. (Da Costa.)

FRACTURE OF THE SHAFT OF THE FEMUR.

This may take place in any part, but is more common in the center than elsewhere, and as a consequence of indirect violence. It may occur, however, as a result of direct force, and more rarely of muscular action. The fracture may be transverse, oblique in any direction, vertical, dentated, comminuted, or impacted, the nature of the force and its direction determining these points. A sharp blow is likely to be followed by a transverse fracture; a crushing force by a comminuted one; an indirect fracture probably will be oblique, according to the natural bend in the lower part of the limb. In the upper third the bone may be broken obliquely from above, and in front downward and outward, and from impaction of the lower extremity into the upper the latter fragment may be comminuted, the bone splitting secondarily upward into the neck.

Diagnosis.—There is usually no difficulty in diagnosing a fracture of the shaft, the following symptoms being usually present: A fall or injury, followed by loss of power in the limb; shortening, which extension can rectify; deformity, probably angular; extra mobility of the lower part of the injured limb; crepitus; and probably the projection of one end of a fragment, with eversion of the foot. When the fracture is transverse, the shortening will rarely be marked. When it is oblique, the direction of the angular deformity often indicates the line of the obliquity. In young children, where the fracture is incomplete, shortening with boning of the limb after an accident, and an indistinct sensation of yielding on manipulation, with or without a peculiar crackling sensation, indicate the nature of the accident.

Treatment.—The fragments having been carefully adjusted by means of extension and gentle manipulation, the mechanical treatment of these fractures consists in the maintenance of extension by means of some applied force, and the complete rest of the coaptated bones, gentle compression of the affected part sometimes being beneficial. To assist the surgeon toward these ends, some anæsthetic may be used, if the pain is severe, and it is impossible by other means to keep the patient at rest, and any spasmodic action of the muscles interferes with the surgeon's aim. (Bryant.)

Every surgeon is expected to use some one of the various splints, according to his fancy. We have the example of Paget and Callender[1] as a warrant for dispensing with all apparatus, "the child being laid on a firm bed, with the broken limb, after setting it, bent at the hip and knee, and laid on its outer side."

Dr. Sans,[2] of New York, warmly advocates the plaster-of-Paris bandages. Bell[3] has spoken in strong terms of the advantages of this method. J. H. Packard, M. D., states that his own experience with it has been very favorable, but it needs to be carefully watched, lest, on the one hand, the compression exerted should be too severe, or, on the other, with the subsidence of swelling, there should be too little control of the fragments.

Hamilton recommends a sort of box, consisting of two long splints, one on each side, extending from the axillæ to beyond the soles, where they are connected with a foot-piece. This latter is so long as to keep the feet widely separated. Coaptation splints of binder's board are applied to the injured thigh, and the leg is bound to the corresponding long splint with a roller. The remainder of the limb, the opposite limb, and the body are made fast with broad, separate strips.

Vertical extension is advocated by Kummel.[4] Smith's well-known anterior wire frame is reported by Wright[5] to have been used with good result in a case of fracture somewhat above the middle of the bone, in a child five years old.

Whatever plan of treatment may be adopted, children with fracture of the femur can not be prevented from wetting the bed, unless care is taken to protect it. Perhaps the best way to do this is to have a thin square pad of absorbent material, with oil silk or rubber cloth beneath it, properly placed to receive the urine, and changed as often as it becomes soiled.

As to the fecal discharges, they should be received in a bed-pan, which should be warmed and very carefully placed under the child, the sound limb being raised for the purpose.

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[1] "Clinical and Pathological Observations in India," p. 237.

[2] *New York Journal of Medicine*, June, 1871.

[3] *Archives of Pediatrics*, May, 1884.

[4] *American Journal of the Medical Sciences*, July, 1882.

[5] "Transactions of the Medical Association of Georgia," 1879.

Union is sometimes very slow in occurring.

Poinsot[1] reported a case where a boy aged ten years had a fracture just below the trochanters, which did not consolidate for six months. The delay was ascribed to "local scurvy." Marks has recorded the case of a girl aged fourteen who at the age of two and a half years had a fracture of the femur at two points; it did not unite for six months, when a fragment was removed from the lower portion; the muscle shrank, and the knee became stiff. At thirteen years and seven months, the bone was again broken at the junction of the middle and lower thirds. Plaster of Paris was applied for three months, and then the fractured ends were rubbed upon one another. The plaster was reapplied, and she got up upon crutches. Union was finally obtained with one and one-fourth inches shortening.

Compound fractures of the femur are very rare in children. They are to be treated on the same principles as in adults, but, as in other parts of the body, the youth of the patient affords more chance for successful conservative surgery.

Sir A. Cooper relates the case of a boy who had his leg entangled in a wheel and sustained a transverse fracture, with separation of the external condyle, which exfoliated. Ankylosis was expected, and the limb was dressed in the straight posture, but five months after the accident the boy walked well, with free use of the joint.

Langenbeck treated a boy aged six who by a fall had a T-fracture of the condyles, the knee-joint being full of blood; yet recovery took place with almost normal movements, and no shortening. A case of separation of the inner condyle of a boy aged fifteen, by the kick of a horse, was reported to Hamilton by Riggs. The whole leg, with the fragment, was displaced upward and inward, reduction being accomplished with much difficulty; but a good recovery ensued.

Fracture of the Bones of the Leg.—These are comparatively infrequent in early life, although in a number of instances reported they have occurred to children within the womb. Malgaigne, among five hundred and fifteen cases of fracture, found but one as young as four years, and but twelve between five and fifteen years. Fracture of the fibula is more common than that of the tibia, particularly in its lower third (in adults); and it is believed that in many examples of what are called bad sprains, a fracture exists. Fracture in the upper two-thirds is usually caused by direct violence, but it may be by indirect violence, such as a wrench or twist of the ankle-joint. Under such conditions the fracture will be oblique. In the lower third the violence is commonly indirect, such as a lateral twist or a forcible eversion of the foot.

Diagnosis.—The diagnosis may be somewhat difficult, and more particularly when no displacement is present. Crepitus may at times be made out by a forcible attempt to move or bend the lower fragments

[1]Bull. et Mēm. de la Sociātē de Chirurgie, October, 1878.

or by some sudden inversion or eversion of the foot; but in trying for this, there is danger of harm being done. Local pain, caused by pressure with the thumb over the seat of fracture, and linear ecchymosis a few days after the accident, are valuable helps to diagnosis in these as in all other kinds of fracture.

Treatment.—In fracture of either of these bones, a natural splint is always found in the same bone; consequently, shortening or deformity rarely follows the accident. The surgeon has simply to apply some splint to insure rest to the broken bone and to the muscles that move the foot—to the inside of the leg when the fibula is broken, and to the outside when the tibia is fractured. The splints should have a foot-piece. In fracture of the lower third of the fibula the foot may be drawn inward, the bandage being applied from without inward; but in many instances nothing more is called for than absolute rest. In other cases a thick pad is often of use opposite the seat of fracture. In no case should the bandage cover the fracture. After the lapse of a few days, or at most a week, when all swelling, with other evidence of local injury, has subsided, the limb may with advantage be put up in some immovable apparatus.

Fractures of Both Bones.—These occur in every variety. The most common is the transverse, about three inches above the ankle; but every form of oblique, dentated, comminuted, and vertical fracture is met with. When near the joint, the vertical into the joint is by no means rare.

Symptoms.—The symptoms of fracture of the leg are too plain to be overlooked. The tibia being a superficial bone, any solution of continuity or deviation of the line of its spine is readily made out, the nature of the accident, loss of power, deformity, and crepitus helping the diagnosis. In fractures close to the ankle, accompanied with displacement, dislocation may be roughly simulated; but the slightest care ought to detect the true nature of the case. The facility with which the displacement of the parts is rectified, the fact that the malleoli retain their normal relative position with the foot, and the ankle-joint moves with facility, proves that the displacement is due to the broken bones, and not to dislocation of the joint. When the lower epiphysis of the tibia is displaced with the foot, there may be some difficulty in making out the true state of the case, but such an accident can occur only in children. It will appear as a transverse fracture, but with no sharp edge of bone, as is usual in fracture, while replacement of the displaced fragments will not give rise to the ordinary crepitus of broken bone, but to a more subdued sensation. (Bryant.)

When a wound complicates the case, the diagnosis is readily made.

Treatment.—In treating a simple fracture, reduce by extension and counter-extension, and use a fracture box. If the soft parts are bruised, use lead-water and laudanum; if they are lacerated, apply antiseptic dressings. The fracture box may be hung upon a gallows.

Plate g.—1, Demi-gauntlet Bandage; 2, Gauntlet Bandage; 3, Spica of the Thumb; 4, Spiral Reverse Bandage of the Upper Extremity; 5, Recurrent Bandage of Stumps; 6, Spiral Reverse Bandage of the Lower Extremity.

After three weeks apply plaster of Paris bandage or silicate of soda dressing, and let the patient sit up in a chair daily for one week; at the end of this time the patient may get about with crutches. At the end of six weeks after the accident, remove the plaster, and let the patient move about on crutches for two weeks, and with a cane for two weeks more. If the fracture is compound, asepticize thoroughly, make a counter-opening, insert a drainage tube, dress with bichloride gauze, apply a plaster bandage, and cut trap-doors over the opening of the drainage tube. Remove the tube, as a rule, in about forty-eight hours; but the patient's temperature is a better guide than time.

Fractures of the Bones of the Foot.—These are somewhat rare accidents. The cause of fracture of either the scaphoid, the cuboid, or any of the cuneiform bones is direct force. Fractures of the os calcis and astragalus arise, as a rule, from indirect force, such as falls, but the calcaneum may be broken by indirect violence. In rare instances the os calcis has been broken by contraction of the great calf muscles.

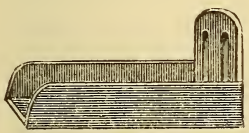

Fig. 37.—Fracture Box.

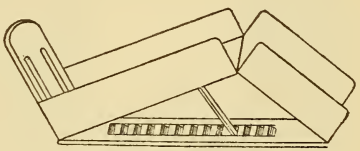

Fig. 38.—Double Inclined Plane Fracture Box.

Symptoms.—In fracture of os calcis there are severe pain, swelling, crepitus, mobility, often an apparent widening of the bone, not unusually a loss of the arch of the foot. (Pick.) In some cases the posterior fragments are drawn up by the calf muscles, and in other cases there is deformity. In fracture of the astragalus, displacement may occur which resembles that of a dislocation. Crepitus may or may not be detected. If crepitus can not be found, it is not certain that a fracture is present, though the patient may be unable to stand and there may be swelling and pain on pressure. Fractures of the other bones may be hard to detect.

Treatment.—To treat a fracture of the os calcis when no deformity exists, the fracture box (Fig. 37) is used for two weeks; maintain the foot at a right angle to the leg; apply lead-water and laudanum; then put on an immovable dressing, and let it be worn for four weeks. In fracture of the os calcis, with drawing up of the posterior fragment, flex the leg upon the thigh, extend the foot, and maintain this position by means of a band around the thigh, the band being fastened by means of a cord to a slipper, the leg resting upon its outer side. At the end of two weeks apply plaster, and let it be worn for four weeks. If the projecting fragment of

the os calcis can not be forced into place, and if it makes dangerous pressure upon the skin, excise it; if it does not make pressure which threatens sloughing, place the joint in a favorable position for ankylosis, and immobilize. In fracture of the astragalus, use a fracture-box, and then an immovable dressing, as in fracture of the os calcis without deformity. Fractures of the other bones of the tarsus may require drainage and immovable dressing, excision, or even amputation.

Fractures of the metatarsal bones are due to direct force, and are almost always compound. Fractures from crushes usually demand excision or amputation. When only one bone is broken, displacement is slight, there is severe pain on motion and pressure, and crepitus can generally be obtained. A simple fracture of a metatarsal bone is dressed in a fracture-box for one week, and in immovable dressing for three weeks.

Fractures of the phalanges of the toes are due to direct force, and are often compound. They may require immediate amputation.

To treat a compound fracture where amputation is unnecessary, drain with strands of catgut for forty-eight hours, and dress antiseptically. At the end of this time, apply over the bichlorate gauze a gutta percha or a pasteboard splint extending from beyond the end of the toe to well up upon the sole of the foot, and fix the splint in place with a spiral bandage of the toe and instep. The splint is to be worn for four weeks. In a simple fracture, use a splint of gutta percha, pasteboard, or binder's board, and let it be worn for three weeks.

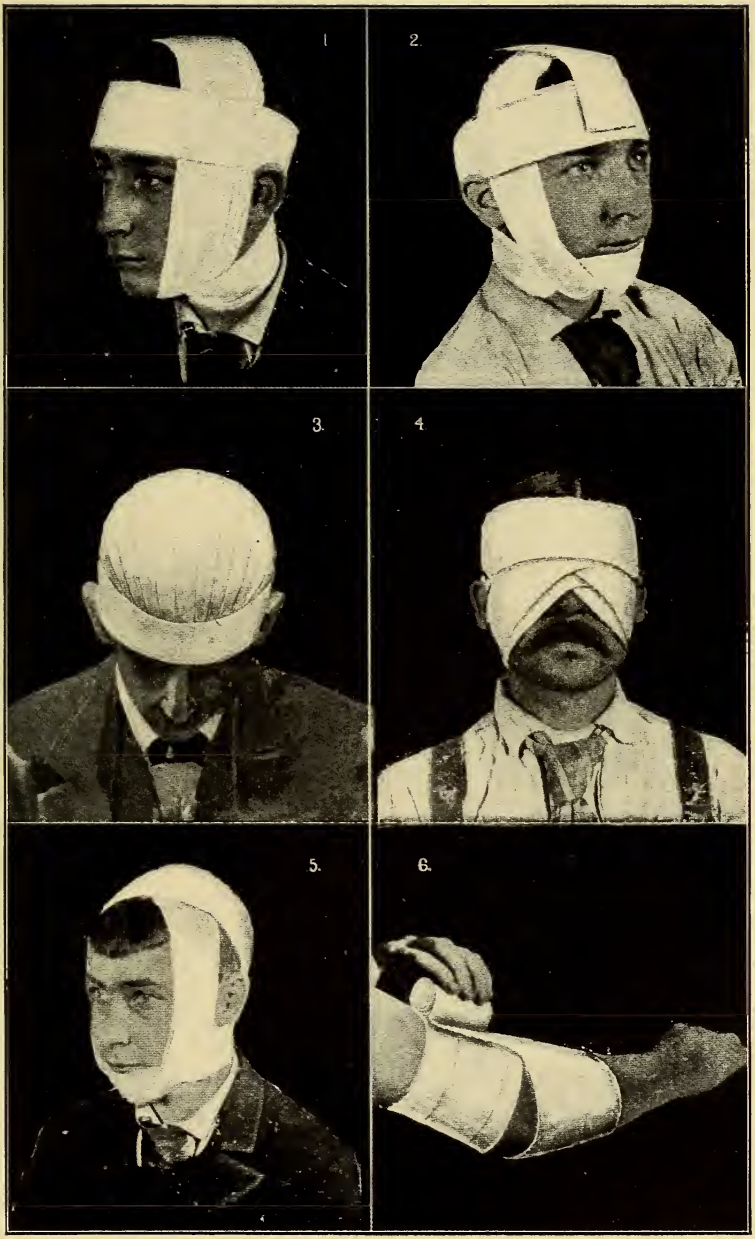

Plate h.—1, Oblique or Crossed Bandage of the Angle of the Jaw; 2, Gibson's Bandage; 3, Recurrent Bandage of the Head; 4, Crossed Figure-of-8 Bandage of Both Eyes; 5, Barton's Bandage or Figure-of-8 of the Jaw; 6, Figure-of-8 Bandage of the Elbow.

CHAPTER LXIII.

SPRAINS, CONTUSIONS, WOUNDS, INJURIES OF JOINTS, AND DISLOCATIONS.

SPRAINS AND CONTUSIONS.

Sprains may be very slight or very serious indirect injuries. They include more or less severe overstretching, if not lacerations, of the ligaments that bind the bones of an articulation together, some fracture or tearing away of the bone at the attachment of the ligaments. In children under ten, sprains of joints are liable to be complicated with some epiphysial separation or incomplete fracture near the epiphysial line, or some crushing or compression of the spongy bone tissue. In the more severe instances are included lacerations of the muscles, tendons, and soft parts that surround the joint. All such accidents require rest and time in their treatment in order that repair may be complete, since neglected sprains are often the cause of joint or bone disease.

Contusions of joints, as direct injuries, always ought to be regarded in a serious aspect; for a large amount of internal mischief may often be sustained with very slight external evidence of injury, and under certain conditions of health, a slight blow upon a bone is often enough to set up severe local action, or to excite chronic changes which may involve the integrity of the joint. During the period of the growth of bone in children, these observations have great force. The nature of the accident and the amount of force concentrated on the joint form the best index to the case, and under all circumstances the prognosis should be guarded and the treatment cautious.

Treatment.—"In sprains of joints, rest is the first principle," said John Hunter, in 1787 (MS. lectures), and at the present day the same words are as pregnant with truth as when then spoken. Indeed, in simple cases of sprain by such treatment alone will convalescence be established. When swelling and effusion into the joint ensue in the course of the second or third day after the accident, the evidence of internal injury is more marked; for such effusion means inflammation, or synovitis, which is to be treated by absolute rest, insured by the application of a splint, the local use of cold or warmth, according to the comfort afforded by either, and occasionally by leeches.

If swelling of the articulation follows immediately upon the injury, effusion of blood into the joint is indicated, with or without fracture, but always with severe local mischief. Such cases should be treated by the employment of a splint, to insure immobility of the articulation, elevation of the injured joint with the patient reclining, and the local application of a bag of pounded ice. If ice can not be obtained, a stream of cold water may be allowed to flow over the joint until the hemorrhage has ceased, all risks of inflammation in it are gone, and repair appears to be going on satisfactorily. As soon as the primary effects of the sprain and all signs of inflammation have passed, the application of pressure to the joint by means of a bandage, or strapping with passive movement, is very efficient. When the joint is rendered very tense from effused blood, it may be aspirated.

When the muscles over the shoulder-joint are severely bruised by a fall, much local pain may be produced, as well as want of power in the arm, exciting a fear of either bone or joint mischief; but a careful examination will show, if no roughness in the examination be used, that the joint can be passively moved without exciting pain, although if the patient attempts to set the muscles in action, pain is produced. The point is one of clinical importance, indicating that the mischief is in the muscle, and not in the articulation, the pain being excited by muscular action, and not by joint movement. (Bryant.)

In delicate children all falls upon the hip, followed by pain, should be treated with rest and extreme care; for a large number of cases of hip disease originate from some such trifling cause; and there is good reason to believe that the majority of hip-joint affections might be prevented by proper attention (by rest) after slight injury.

After-treatment.—When the immediate effects of the sprain have passed away, the local use of a stimulating liniment and moderate friction applied to the part expedites the cure and at the same time gives comfort to the patient. A local warm bath at intervals likewise relieves the stiffness of the joint. Whenever movement excites more than a momentary pain, rest should be observed; and if the pain continues, some chronic inflammatory change ought to be suspected and treated. When weakness of the joint alone remains, a good bandage or strapping around the part, to give support, is of great benefit.

Where much laceration of ligament has taken place, it is at times necessary for the joint to have some permanent artificial support, in the form of either a splint, felt, leather casing, or bandage; for no parts are repaired with less permanent power than ligaments. In the wrist, when much swelling exists, a sprain may be mistaken for a fracture or a fracture for a sprain, as fractures about the end of the radius are generally impacted, and not, consequently, attended by crepitus. Much care is necessary in the diagnosis of such cases. Many sprains of the ankle are also really cases of fracture of the

fibula above the malleolus. The popular notion that a severe sprain is worse than a fracture is in the main true; and where the sprain is neglected, the case is always more tedious than that of a broken bone. In a severe sprain, place the extremity upon a splint, and to the joint apply flannel kept wet with lead-water and laudanum, iced-water, tincture of arnica, alcohol and water, or a solution of chloride of ammonium. The ice-bag should from time to time be laid upon the leg with a flannel between for a period of twenty or thirty minutes. Leeches around the joint do good. Constitutionally, employ the remedies for inflammation. These remedies are "general bleeding, arterial sedatives, cathartics, diaphoretics, diuretics, anodynes, antipyretics, emetics, mercury and iodides, stimulants, and tonics.

"*General Blood-letting.*—When a patient is strong, young, and robust, venesection is suited to the early stages of an acute inflammation. General blood-letting diminishes blood-pressure and increases the speed of the blood-current, thus amending stasis, absorbing exudate, and washing adherent corpuscles from the vessel-wall; furthermore, it reduces the whole amount of body-blood, thus forcing a greater rapidity of circulation, decreases the amount of fibrin and albumin, lowers the temperature, arrests cell proliferation, and stops the effusion of lymph." (Da Costa.)

Arterial sedatives are of use before stasis is pronounced; if used after it exists, they will increase it. If stasis exists, relieve it by bleeding before using the sedatives. Venesection abolishes stasis and lowers tension, and arterial sedatives maintain the effect and the ground which is gained. The arterial sedatives employed are aconite, veratrum viride, gelsemium, and tartar emetic. These sedatives lessen the force and frequency of the heart-beats, and thus slow and soften the pulse, and are suited to a robust person with an acute inflammation, but are not suited to a weak man in an adynamic state.

Aconite is given in small doses, never in large amounts. One drop of the tincture in a little water is given every half hour until its effect is manifest on the pulse, when it may be given every two or three hours.

Veratrum viride is a powerful agent to slow the pulse and to lower blood-pressure; it produces moisture of the skin and often nausea. It is given in one-drop doses by the physician only, until its physiological effects are manifested, when the period between doses is extended to two or three hours. Ten drops of laudanum given a quarter of an hour before each dose of aconite or of Veratrum viride will correct nausea.

Gelsemium is an arterial sedative highly approved by Bartholow. It is given in doses of ten drops of the tincture every three or four hours.

Cathartics.—The tongue affords the chief indication for the use of cathartics. Treatment in an inflammation can be begun, if con-

stipation exists, by giving a cathartic. Castor-oil can be given in capsules, or the juice of half a lemon can be squeezed into a tumbler, four ounces of oil poured in, and the rest of the lemon squeezed on top, thus making a not unpalatable mixture. Aloin, podophyllum, the salines, as salts and magnesia, and calomel, in from three to five-grain doses, followed by a saline, have their advocates.

Diaphoretics are very useful. Dover's powder is commonly used, but pilocarpine is preferred by some. Camphor in doses of from five to ten grains is a diaphoretic, and so are antimony and ipecac. Acetate and citrate of ammonium, opium, alcohol, hot drinks, heat to the surface (baths, hot drinks, and hot-water bags), serpentaria, and guaiac are diaphoretic agents.

Diuretics are useful in fevers when the urine is scanty and high-colored, and are valuable aids in removing serous effusions and other exudates. Among the diuretics may be mentioned calomel in repeated (small) doses, cocaine, caffeine, alcohol, digitalis, the nitrates, squill, turpentine, copaiba, and cantharides. The liquor potassa and the acetate of potassium are the best agents to increase the solids in the urine. Large draughts of water wash out the kidneys. The liquor potassæ citratis in doses of gr. xxx is efficient. In weak heart, the citrate of caffeine is a good stimulant diuretic.

Anodynes and hypnotics may be required in inflammation. Dover's powder, besides being diaphoretic, is anodyne. Opium acts well after bleeding or purgation. If it causes nausea, it should be preceded one hour by gr. xx or xxx of bromide of potassium. Opium is used by the mouth, by the rectum, or hypodermically. It is used when there is pain, but its use is not to be long persisted in if it can be avoided. It should be given in doses measured purely by the necessities of the case.

Antipyretics are those remedies which lessen heat-production and those which increase heat-elimination. Quinine, salicylic acid, and the salicylates, kairine, alcohol, antimony, aconite, digitalis, cupping, bleeding, nitrous ether, antipyrine, antifebrine, phenacetine, opium, ipecac, cold to the surface, and cold drinks. "In surgical inflammations it is rarely necessary to employ heroic means to lower temperature."

ANKYLOSIS.

Definition.—When a joint-inflammation eventuates in the formation of new tissue in and about the joint, contraction of this tissue limits or destroys joint-mobility, producing the condition known as "ankylosis." Ankylosis may be complete (bony), or incomplete (fibrous); it may arise from contractures in the joint, or from contractures in the structures external to the joint.

Treatment.—An effort should always be made to prevent an ankylosis by treating carefully any joint-inflammation, and by beginning passive motion at the earliest safe period. To limit inflamma-

tion is to prevent ankylosis. Many cases of fibrous ankylosis are improved by passive movement, massage, friction, stimulating liniments, galvanic current of electricity, inunctions of ichthyol or mercurial ointment, or hot and cold douches. Some cases may be straightened out slowly by screw-splints or by weights and pulleys. Fibrous ankylosis of the elbow is best treated by using the joint. Fibrous ankylosis is often corrected by forcible straightening. If the tendons are much contracted, tenatomy should be performed two or three days before forcible straightening is attempted. In order to straighten, always give ether. Suppose a case of ankylosis of the knee, put the patient upon his back, bring the leg over the end of the operating-table, grasp the ankle with one hand and the lower portion of the leg with the other hand, and make strong, steady movement of flexion and extension until the limb can be straightened. The adhesions will be felt to break, the snapping often being audible. At once apply a plaster-of-Paris dressing, and keep the limb immobile for two weeks. This procedure is not free from danger. Vessels may be ruptured, nerves may be torn, skin and fascia may be lacerated, suppuration may ensue from the admission into the joint of encapsuled cocci, and organisms in the blood may find this area a point of least resistance. Because of the danger in a tubercular or a septic arthritis, do not forcibly break up an ankylosis, but use gradual extension by weights or by screw-splints. (Da Costa.)

WOUNDS OF THE JOINTS.

These are always serious accidents, yet as a whole, if treated with discretion and at an early period of their existence, they are fairly successful in their issue.

A joint is known to be wounded when its contents escape, the oily, glutinous nature of synovia rendering its flow very manifest. Joints are sometimes wounded without any evident escape of their contents; such doubtful cases are clinically to be treated as cases of wounds. In every case of wounded joint, however trivial, and in all doubtful cases of wounded joints, the prognosis must be very guarded and the treatment cautious.

Treatment.—A clean incised wound should be well cleansed with carbolic or iodine water, and its edges accurately adapted with sutures. A contused or lacerated one should likewise be well washed and the joint syringed, and if the edges of the wound are brought partially together, sufficient opening should be left for drainage. The wound in both cases should be dressed with some absorbent antiseptic dressing, such as carbolic, iodoform, or salicylate gauze. Probing must be avoided, and the joint should be kept in absolute repose by the application of a padded splint. Cold should then be applied, nothing checking pain or subduing inflammation and effusion better. The cold, however, to be of value, must be persistently maintained, as any intermission of its use is almost sure to be followed by increase of pain

and effusion. If ice can not be obtained, frequent applications of cold cloths may be allowed to lay over the wound. To seal hermetically a small wound with a piece of lint soaked in the compound tincture of benzoin, and at the same time apply cold, is excellent practise. Should an interval have passed between the accident and the application of the cold, and much joint inflammation exist with constitutional symptoms, the application of leeches to the joint, and subsequently of cold, is beneficial. In exceptional examples, where cold is not tolerated, warm fomentations must be substituted. Opium is always of use, the patient being kept fairly under its influence by one grain two or three times a day. Mercury is useless. Give colchicum where gout is suspected. In feeble patients tonics are required. When all acute symptoms have subsided, and chronic effusion remains, the application of a fly-blister or of blisters, expedites the absorption of the effused fluid, and the benefit of pressure by the adjustment of well-applied strapping is very great. In feeble patients tonics are required. Should suppuration appear, active treatment is called for, such as a free incision into the joint (in case of abscess) as soon as any pus can be detected. The limb should be raised, the joint preserved at rest by splints, and warm-water dressing or a flaxseed poultice applied; and the joint should be kept absolutely quiet till repair has been completed. (Bryant.)

The best treatment for knee-ankylosis is the use of the joint.

CHAPTER LXIV.

DISLOCATIONS.

Definition.—Dislocation is the persistent separation from each other, partially or completely, of two articular surfaces.

PREDISPOSING CAUSES.

Age.—Dislocations are commonest in middle life, the usual lesion of the young being green-stick fracture, and that of the old being fracture. Dislocations of the radius are not uncommon in youth.

Muscular Development.—Dislocations are most common in those with powerful muscles.

Sex.—Males are more predisposed than females, because of their occupations and muscular strength.

Occupation is a predisposing cause, according as it demands the employment of muscular force, as in the carrying of burdens.

Nature of the Joint.—Ball-and-socket joints are more liable to dislocation than are ginglymus joints, because of their wide range of motion. Joint disease predisposes by relaxing the ligaments.

Exciting Causes.—These are external violence and muscular action. External violence may be direct, as when a blow upon one of the bones forces it directly away from the other; or it may be indirect, as when a blow at a distant part of a bone transmits force to its end, and drives the bone out of its socket. Muscular action is a cause when sudden and violent muscular contraction occurs, when the joint is in a position which gives the muscles full sway, and throws the head of the bone against the weakest part of its retained ligaments.

Pathological Conditions.—In a recent complete traumatic dislocation the ligaments are damaged, and may perhaps show extensive laceration, or may show only a button-hole laceration, through which a bone projects. External force produces much laceration and little stretching of the ligaments; muscular action produces little laceration and much stretching of the ligaments. (Mears.) In some cases of dislocation due to external violence, the structures about the joints are bruised or otherwise damaged, the old socket is filled with blood, and the bone in its new situation lies in a bloody area. Large vessels and nerves are rarely torn, though they may be much compressed.

If a dislocation is not soon reduced, inflammation arises in the old joint and about the displaced bone, and the whole area is glued together, first by coagulated exudate, and next by embryonic tissue. After a time, in ball-and-socket joints, the old socket fills with fibrous

tissue, contracts, becomes irregular, and may even be obliterated. The head of the dislocated bone alters its shape, its cartilage is destroyed or converted into fibrous tissue, and the pressure of the head of the bone forms a hollow in its new situation, which hollow becomes surrounded by fibrous tissue or even by bone. A new joint may form, the surrounding tissue becoming a compact capsule, and a bursa forming between the head of the bone and its new socket. In a dislocated hinge-joint the ends of the bone alter greatly in shape, and their cartilage is converted into fibrous tissue. In an unreduced dislocation the muscles shorten, or lengthen, or undergo atrophy or fatty degeneration, as the case may be. An unreduced dislocation of the ball-and-socket joint may give a fairly movable new joint, but an unreduced dislocation of a hinge-joint rarely allows of much motion.

General Symptoms of Traumatic Dislocations.—In general, traumatic dislocations are indicated, first, by pain of a sickening, nauseating character; second, by rigidity. Voluntary motion is impossible, except to a slight extent in the direction of the deformity. For instance, in a dislocation of the inferior maxillary, the jaw can be opened a little more, but it can not be closed. This rigidity brings about loss of function. When the surgeon attempts to move the joint, he finds it very rigid. Third, by change in the shape of the joint, as flattening of the shoulder after dislocation of the humerus. Fourth, by alteration in the mutual relations of bony prominences about a joint (alteration of the relation between the olecranon and humeral condyles in dislocation of the elbow backwards). Fifth, by feeling the displaced bone in its new situation. Sixth, by missing the head of the bone from its proper situation. Seventh, by alteration in the length of the limb (in dislocation of the femur into the thyroid foramen the leg is lengthened, but in dislocation into the dorsum of the ilium it is shortened). Eighth, by alteration in the axis of the bone. In dislocation upon the dorsum of the ilium, the axis of the injured thigh would, if prolonged, pass through the lower third of the sound thigh.

Diagnosis of Traumatic Dislocation.—A dislocation may be mistaken for a fracture. In dislocation there is rigidity; in fracture there is preternatural mobility. In dislocation there is no true crepitus (may get tendon or joint crepitus); in fracture there usually is crepitus. In dislocation the deformity does not tend to recur after reduction; in fracture it does recur after extension is relaxed. In a sprain the movements of the joint are only limited, not abolished by an almost complete rigidity. The change which a sprain may cause in the shape of a joint is due to effusion or to bleeding. There is no alteration in the relation of the bony prominences to one another. There is no notable alteration in the length of the limb (a slight increase in length may arise from joint-effusion, or the head of the bone may subsequently be absorbed, and thus produce shortening after some weeks). There is no alteration in the axis of the bone. The

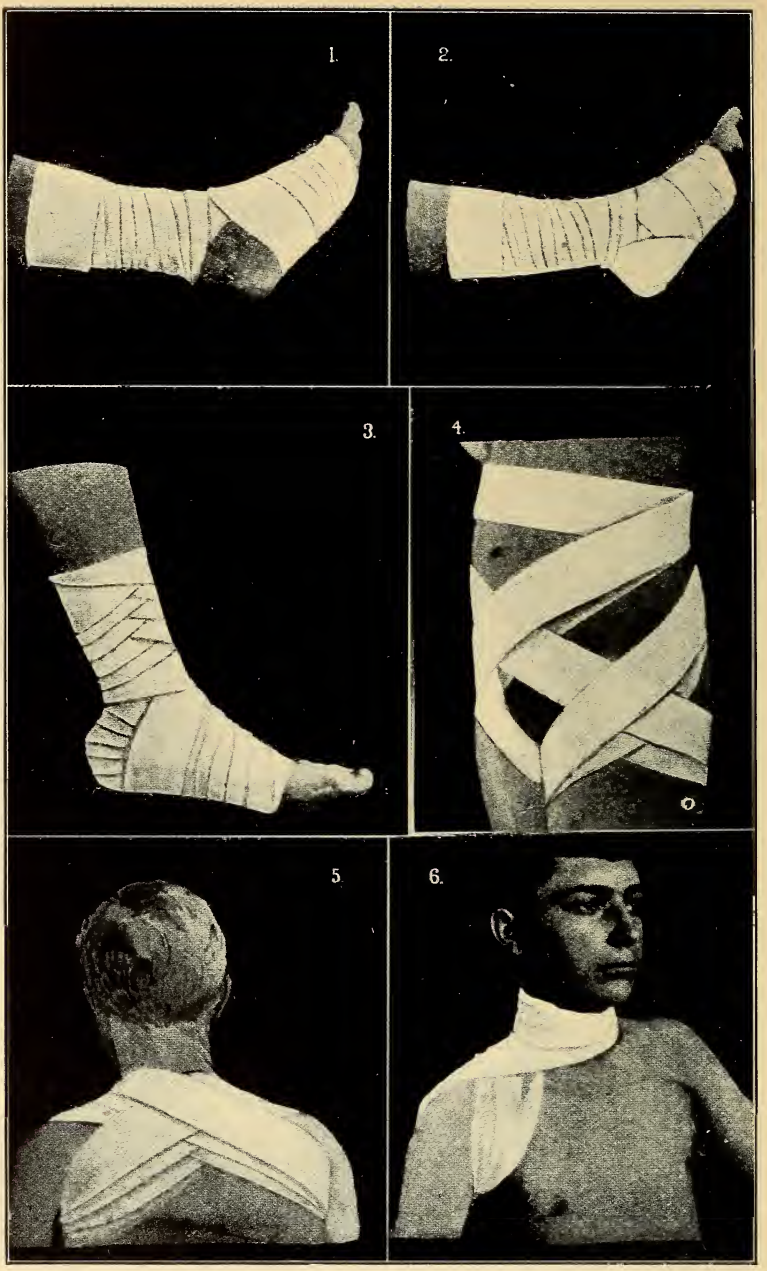

Plate i.—1, Figure-of-8 Bandage of the Ankle; 2, Method of Covering the Heel; 3, Spica of the Instep; 4, Spica of the Groin; 5, Posterior Figure-of-8 of Both Shoulders; 6, Figure-of-8 of Neck and Axilla.

head is not felt in a new position, it being found in its normal place. Always remember that a fracture may exist with a dislocation. In any doubtful case,—in fact, in most cases,—give ether, for a dislocation should be reduced while the patient is anæsthetized, except in dislocation of the jaw, of the fingers, of the carpus, etc. In some cases swelling renders the diagnosis difficult or impossible. Always compare the injured joint with the corresponding joint of the sound side. (Da Costa.)

Treatment.—In all cases the reduction of the dislocation or displacement should be effected as soon as possible, delay being justifiable only when the appliances required for the purpose are not at hand, or the diagnosis is uncertain. Most dislocations, not excluding those of the hip, may be readily reduced directly after their occurrence by extension or manipulation without the aid of an anæsthetic; but when any time has been allowed to pass and the immediate constitutional effects of the accident have subsided, it is a fair question whether it is advisable to attempt reduction before anæsthetizing the patient; for under the most favorable circumstances, without this aid much force will to a certainty be called for, whilst with it the gentlest manipulation is often enough. In no department of surgery is the benefit of anæsthetics better demonstrated than in this; for where force was formerly practised, gentleness now suffices, and where difficulty and pain were common accompaniments, facility of reduction and painlessness are now the rule. Under their influence all muscular spasm ceases to be a force which has to be overcome, and the surgeon has simply to replace the bone through the rent in its capsule by such gentle manipulative acts as the special requirements of each case appear to indicate. The facility, however, with which a dislocation is reduced by manipulation turns much upon the surgeon's knowledge of the way the dislocation was produced; for, in a general sense, the best way to reduce a dislocation is to make the head of the bone retrace the course it followed after it had first burst through its capsule, the untorn parts in the capsule being doubtless the main obstacle to reduction. Muscular spasms are eliminated by the use of an anæsthetic.

In neglected cases of dislocation, where false joints and adhesions exist, force is called for to break them down, and pulleys may be wanted; but they must always be employed with the greatest caution, for fear of injury to the axillary artery, and laceration of the ligaments, injuries which we see mentioned in reported cases.

After-treatment.—After the reduction of a dislocation, the limb should be kept at rest and fixed by bandages on a splint. Sedillot's rule of simply placing the joint in a position the opposite of that in which it was when the dislocation occurred, is sound. When any signs of inflammation show themselves, cold, in the shape of ice in a bag, should be employed; leeches are seldom called for.

At least three or four weeks are required for repair to take place before any useful free movement of the joint can be allowed, although,

when no inflammatory symptoms appear, passive movement may be permitted at the end of two weeks. In dislocation of the hip, no walking or standing should be permitted for a month.

When reduction can not be accomplished after a reasonable attempt, a second one may be made at a subsequent period after the effects of the first have passed; that is, if any sound hope exists of success being secured, some modification of the means employed probably suggesting itself to the surgeon upon reflecting as to the peculiarity of the case and the cause of his failure.

When the patient is an adult, the difficulties and prospects of the case should be laid before him and his opinion taken, not, however, as to the desirability or the reverse of the attempt, for such an opinion belongs to the surgeon and his colleagues only, but as to the risks that must be run; for in many reported cases failure of reduction—more particularly of forcible reduction—is followed by some destruction of the new joint that nature has partially formed, by some inflammatory change that may end in the destruction of the joint or in rendering its usefulness still less promising.

DISLOCATION OF THE CLAVICLE.

The causes of forward dislocation of the clavicle are blows, falls, or pulls, which drive or draw the shoulder backward.

Symptoms.—When the dislocation is partial, some usual prominence of the end of the bone, on comparing it with its fellow, will suggest its nature, the bone being only covered with skin and readily pressed back. When complete, the nature of the accident will be still better marked, and the end of the bone will be usually found pointing downward. Inflammatory thickening of the joint should not be mistaken for partial displacement.

Treatment.—There is usually little or no difficulty in reducing this form of dislocation by forcibly drawing back the shoulder and applying pressure to the displaced bone, though there is great difficulty in keeping the bone in its normal position; indeed, as a rule, it is quite impossible to do this satisfactorily. Bryant states that he has succeeded by keeping the patient on his back in bed for three weeks, with his arm bound to his side. A pad in the axilla, with a figure-8 bandage to keep the shoulder outward, the elbow being bound to the side, will do much towards the desired end, and a pad of lint applied outside the displaced end of the clavicle and firmly fixed in position by strapping carried over the shoulder and scapula, is very beneficial.

DISLOCATION OF THE SCAPULA.

The symptoms are well marked. The falling of the shoulder and projection upward of the acromial end of the clavicle in one, and the projection upward of the acromion process of the scapula in the other, prevents any mistake being made.

In the more usual form of this accident the acromion process of the scapula is forced beneath the clavicle. In rare cases it may be received above it. Both are commonly caused by direct violence to the shoulder.

Treatment.—In the dislocation of the scapula downward the aim of the surgeon is to raise the scapula with the arm and depress the clavicle, which is best done by drawing the elbow well backward and applying a pad over the clavicle, the pad and elbow being fixed in position by means of a belt or plaster-of-Paris bandage passed over the clavicle and round the elbow. The belt presses the clavicle downward, and raises the shoulder and arm upward. The surgeon, in all cases recognizing the special wants of the case, must adapt his means to meet them in the best possible way. Good movements of the arm are, as a rule, acquired in time after either of these accidents. (Bryant.)

The treatment of dislocation of the lower angle of the scapula comprises massage, electricity, passive motion, and deep injections of strychnæ.

DISLOCATIONS OF THE HUMERUS (SHOULDER-JOINT).

These injuries are most frequent because of the free mobility of the shoulder-joint, its anatomical insecurity, and its exposed situation. These dislocations are rare in the very young and in the aged, being oftenest encountered in muscular young adults. Four forms of shoulder-joint dislocations exist, namely: First, forward, inward, and downward, under the coracoid process—subcoracoid; second, downward, forward, and inward, beneath the glenoid cavity—subglenoid; third, backward, inward, and downward, under the spine of the scapula—subspinous; and fourth, forward, inward, and upward, under the clavicle—subclavicular.

SUBCORACOID DISLOCATION.

This may be caused by direct force driving the head of the humerus forward and inward, or by indirect force, such as falls upon the hand or the elbow.

SUBGLENOID OR AXILLARY DISLOCATION.

This form of dislocation may be produced by contraction of the great pectoral and latarsimus-dorsi muscles when the arm is at a right angle to the body; but it is usually due to falls upon the hand or the elbow when the arm is raised, and the head of the bone is against the lower portion of the capsule. In this dislocation the head of the bone rests upon the border of the scapula, below the tendon of the subscapularis, in front of the long head of the triceps above the teres muscles.

SUBSPINOUS AND SUBCLAVICULAR DISLOCATIONS.

These are very rare injuries. They are caused by the same sort of violence which produces subcoracoid dislocations. In the very rare form known as the "supracoracoid," the head of the coracoid is always fractured.

Symptoms of Dislocation of the Shoulder-joint.—Dislocation is diagnosticated by, first, pain of a sickening character; second, flattening of the shoulder, the head of the bone having ceased to bulge out the deltoid muscle; third, apparent projection of the acromion through sinking in of the deltoid; fourth, a hollow beneath the acromion, over the empty glenoid cavity, and the bone missed from its normal habitat; fifth, rigidity (some movement is possible, in the direction especially of an existing deformity, but mobility is strictly limited, and attempts at motion produce great pain); sixth, the elbow does not touch the side when the hand is placed upon the sound shoulder (Dugas' sign. This is due to the rotundity of the chest. In a dislocation the head of the bone is already touching the chest, and the bone, being approximately straight, can not touch it in two places at the same time. If the elbow can be placed against the chest with the hand on the sound shoulder, there can be no dislocation; if it can not be so placed, there must be dislocation); and, seventh, finding the head of the bone in a new situation. Most of these symptoms may be grouped as Erichson's list of signs.

The following table, from T. P. Pick's work on fractures and dislocations, makes the above points clear:—

	Direction of the Axis of the Limb.	Alteration in the Length of the Limb.	Presence of the Head of the Bone in New Situation.
Subcoracoid.....	The elbow is carried backward and slightly away from the side.	Very slightly lengthened.	The head of the bone can not easily be felt; if it can, it is found at the upper and inner part of the axilla.
Subglenoid	The elbow is carried away from the trunk and slightly backward.	Very considerable lengthening.	The head of the bone can easily be felt in the axilla.
Subspinous.....	The elbow is raised from the side and carried forward.	Lengthening intermediate in degree between the subglenoid and the subcoracoid.	The head of the bone can be felt and grasped beneath the spine of the scapula.
Subclavicular..	The elbow is carried outward and backward.	Shortening.	The head of the bone can readily be seen, and can be felt beneath the clavicle.

In a shoulder-joint dislocation the head of the bone may press upon the brachial plexus and produce pain and numbness, and some-

times a traumatic neuritis or paralysis; sometimes pressure upon the axillary vein causes œdema, and pressure upon the axillary artery diminishes or obliterates the pulse. The axillary vessels may be torn and the muscles may be lacerated badly. The capsule is torn, and considerable blood is usually effused. Swelling is due, first, to hemorrhage, and, secondly, to inflammation.

Diagnosis of Shoulder-joint Dislocation.—In fracture of the neck of the scapula there is prominence of the acromion and a hollow below it, a hard body being felt in the axilla; but the coracoid process descends with the head of the bone, which it does not do in dislocation. Furthermore, in fracture there is rigidity; in dislocation, mobility. In fracture crepitus is present; in dislocation it is absent. In fracture the deformity is easily reduced, but it at once recurs; in dislocation it can not be so manipulated. In fracture of the anatomical neck of the humerus, deformity is slight; the head of the humerus is found in place, and does not move when the shaft is rotated; and the head is not in line with the axis of the bone. Crepitus exists in fracture if impaction is absent. In paralysis of the deltoid there is distinct flattening, but the bone is felt in place, and there is no rigidity.

Treatment.—Reduction by manipulation is usually obtained in recent cases of shoulder-joint dislocation. Always give ether. Forward dislocations (subcoracoid, subclavicular, and axillary) are reduced by Kocher's method. Put the arm against the side, flex the forearm to a right angle with the arm, perform external rotation of the arm until the forearm is at a right angle with the body, raise the elbow, make internal rotation, and place the hand on the opposite shoulder. The formula is, flexion of the forearm, external rotation, abduction, and internal circumduction of the arm. In reducing shoulder-joint dislocation, the surgeon uses his own judgment as to the various movements best suited to the case. Another method of manipulation is as follows: If the right shoulder is dislocated, the surgeon stands behind the patient (whose shoulders are raised); if the left shoulder is dislocated, he stands in front of the patient. The surgeon holds the arm flexed upon the forearm with his right hand, and makes external traction and rotation, and with the fingers of his left hand he tries to force the bone into place.

Reduction by Extension.—In reduction of shoulder-joint dislocation by extension the patient is anæsthetized and placed upon a low bed or upon the floor. The surgeon then places his foot, covered only by a stocking, in the axilla. Place the sole of the foot, not the heel, against the chest high up, the instep being made to touch the humerus and the heel the border of the shoulder-blade, a towel being first put into the axilla to rest the foot against. If the left arm is dislocated, use the left foot, or *vice versa.* Make steady extension, which will, in many cases, bring about the reduction. A good method, which is well thought of by some surgeons, is that in which the surgeon stands behind the patient, steadies the scapula with his foot or hand, and carries the

patient's arm above his head, making extension and external rotation. (Cooper.) Cock advises, when reduction fails, that an air-pad be placed in the axilla, and the arm be bound to the side,—a method by which reduction will often take place after two or three days. The pulleys are very rarely used, as they develop a dangerous force.

After reducing a dislocation, apply a Velpean bandage, keep the shoulder immobile for one week; then make passive motion daily. The

Fig. 39. — Reduction of Shoulder-joint Dislocation by the Knee in the Axilla. (Cooper.)

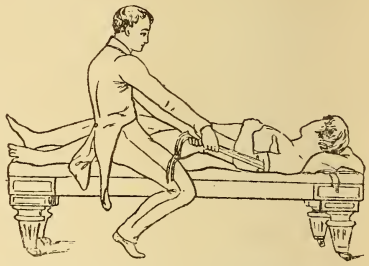

Fig. 40.—Reduction of Shoulder-joint Dislocation by the Foot in the Axilla. (Cooper.)

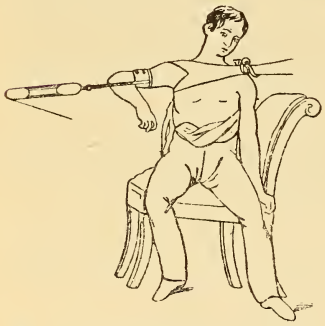

Fig. 41.—Reduction of Shoulder-joint Dislocation by the Pulleys. (Cooper.)

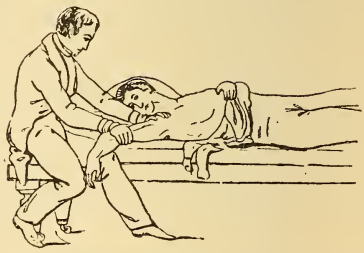

Fig. 42.—Reduction of Shoulder-joint Dislocation by Extension Upward. (Cooper.)

patient may wear a sling alone during the third week, after which period he may use his arm.

DISLOCATIONS OF THE ELBOW-JOINT.

Injuries of the elbow-joint are not rare, and they are most common in children. Both bones or only one bone may be dislocated, and the dislocation may be partial or be complete. The cause of backward

dislocations of both bones of the elbow-joint are falls upon the extended hand or twists inward of the ulna. The coronoid process lodges in the olecranon fossa. (Malgaigne.)

Symptoms of Backward Dislocation.—In complete dislocations of both bones of the elbow-joint the olecranon is very prominent; the distance between the point of the olecranon and the apex of the inner condyle is notably greater than on the sound side; the forearm is flexed, supinated, and shortened; the lower end of the humerus projects in

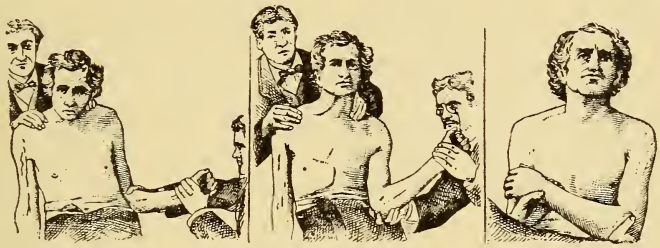

Fig. 43.—Kocher's Method of Reduction by Manipulation (Ceppi): a, first movement, outward rotation; b, second movement. elevation of elbow; c, third movement, inward rotation and lowering of elbow.

front of the joint, below the skin-crease; the head of the radius is found back of the outer condyle; there are the general symptoms of dislocation. Fracture of the coronoid rarely occurs with backward dislocation; but if it does occur, there will be crepitus and mobility. In fracture above the condyle there are found the ordinary symptoms of a fracture; measurement from condyles to styloid processes does not show shortening; there is no alteration of normal relations between the

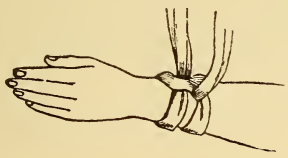

Fig. 44.—Clove-hitch Knot Applied above the Wrist. (After Erichsen.)

Fig. 45.—Dislocation of Radius and Ulna Backward. (From Sir A. Cooper.)

olecranon process and the condyles; and the projection in front of the joint is above the crease of the bend of the elbow.

Treatment of Backward Dislocation.—Reduction must be made early in dislocations of both bones of the elbow-joint, or it will be found impossible, and an unreduced dislocation means a limb without the powers of flexion, pronation, or supination. The surgeon places his knee in front of the elbow-joint, grasps the patient's wrist, presses upon the radius and ulna with his knee, and bends the forearm with

considerable force, the muscles pulling the bones into place. (Sir Ashley Cooper's plan.) Apply an anterior angular splint, and have it worn for two weeks. Make passive motion after a few days.

DISLOCATION OF BOTH BONES FORWARD.

The cause of forward dislocation of both bones of the elbow-joint is a blow on the olecranon when the arm is flexed. It is a rare accident.

Symptoms.—The symptoms of forward dislocation of both bones of the elbow-joint are: The forearm is flexed and lengthened; some slight motion is possible; the olecranon is on a level with the condyles, if unfractured, hence its prominence is gone; the humeral condyles are felt posteriorly, and the radius and ulna are felt anteriorly.

Treatment.—The treatment of this injury is the same as that for dislocation backwards. Forced flexion and pressure may be employed for reduction.

Symptoms and Treatment of Outward Dislocation.—The symptoms of outward dislocation of both of the bones of the elbow-joint are: The forearm is flexed, fixed, and pronated; the joint is widened; the head of the radius projects externally, and has a depression above it; the inner condyle projects internally, and has a depression below it; the olecranon is nearer than normal to the external condyle, and further than normal from the internal condyle. Reduction is effected by extension of the forearm and pressure upon the head of the radius. Apply an ascending spiral reverse bandage to the forearm, a figure-8 bandage to the elbow-joint, and a sling. Make passive motion after a few days. The bandage must be worn for two weeks.

Symptoms and Treatment of Inward Dislocation.—In dislocation inward of both bones of the elbow-joint, the position of the forearm is the same as that in dislocation outward; the sigmoid cavity of the ulna projects internally, and the external condyle projects externally. The treatment of this form of elbow-joint dislocation is the same as that employed in the preceding form.

Dislocation of the ulna alone is very rare, and can only take place backward.

Symptoms and Treatment.—Dislocation of the ulna alone is indicated by the forearm being flexed and pronated. The head of the radius is found in place, and the olecranon projects posteriorly. The treatment of this injury is the same as that for the preceding dislocation.

DISLOCATIONS OF THE RADIUS FORWARD.

Dislocation of the radius forward is the most common form. This injury is caused by a fall upon the hand with the forearm in pronation and extension, or is produced by blows on the back of the joint; forced pronation alone will cause it.

Symptoms and Treatment.—The symptoms in dislocation of the radius forward are: The forearm is midway between pronation and supination, and semiflexed; attempts to increase flexion cause the radius to strike against the humerus with a distinct blow; the head of the radius is felt in front of the outer condyle, and is missed from its proper abode. Reduction is effected by extension and manipulation. A padded splint is used as in dislocation of both bones. Deformity is apt to recur after reduction, because of rupture of the orbicular ligament.

Treatment.—The treatment of dislocation of the radius backward is the same as that given in forward dislocation.

Dislocation of the Head of the Radius.—This injury is very frequent in children between two and four years of age. It results from traction upon the hand or the forearm, and often arises when the nurse or mother pulls upon a child's arm to save it from a fall or to lift it over a gutter. Some writers hold that pronation is required, as well as extension, to produce the injury. Many surgeons claim that extension and adduction are the causative forces.

Symptoms.—The history points to the injury. Pain, and often a click, may be felt in the wrist at the time of the accident. The arm hangs by the side, with the elbow-joint slightly flexed and the forearm midway between pronation and supination. Flexion and complete extension are resisted, and are very painful, but movements between 60° and 130° are free and painless.[1] The movements of the wrist-joint are free and painless. The elbow presents no deformity. Pressure over the head of the radius causes pain. Strong pronation is painful. Strong supination is very painful. Forced supination develops a distinct click at the head of the radius, and causes pronation and supination to become natural and free from pain. The condition will be reproduced if a splint is not used. The nature of the lesion is said not to be understood, and various conditions have been thought to exist by different observers. Among them is mentioned the following: A slight anterior displacement; locking of the tuberosity of the radius behind the inner edge of the ulna; dislocation of the triangular cartilage of the wrist; intracapsular fracture of the radial head; painful paralysis from nerve injury; displacement by elongation, the return of the bone being prevented by collapse of the capsule, and slipping up of the margin of the orbicular ligament over the rim of the head of the radius.

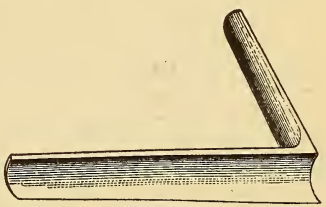

Fig. 46.—Anterior Angular Splint.

Treatment.—Place the forearm at a right angle to the arm, and make forcible supination; apply an anterior angular splint, and have it worn for four or five days.

[1] W. W. Van Arsdale, in the "Annals of Surgery," vol. 9, 1889.

DISLOCATIONS OF THE WRIST.

These are very rare, and are caused by falls upon the hand.

Symptoms of Backward Dislocation of the Wrist.—The deformities in backward dislocation of the wrist are: The fingers are flexed; the wrist is bent backward; the radius projects on the front of the wrist; the carpus projects on the dorsal surface of the arm; the relation of the styloid process of the radius to the styloid process of the ulna is unaltered; there is rigidity, and crepitus is absent.

Treatment.—The treatment in both backward and forward dislocation of the wrist is extension and manipulation, a bond splint for ten days, and passive motion after five or six days.

Dislocation at the inferior radio-ulnar articulation, which is also very rare, is caused by a twist.

Symptoms.—In forward dislocation at the inferior radio-ulnar articulation, the forearm is pronated, the space between the styloid processes is diminished, and the ulna forms a projection posteriorly. In backward dislocation the forearm is supinated, the space between the styloid processes is diminished, and the ulna projects in front.

Treatment.—This is by extension and manipulation. Two straight splints (as in fracture of both bones) are to be applied for four weeks, and passive motion is to be made in the third week.

Pick says, in dislocation of individual carpal bones, that there is one weak spot, which is "between the head of the os magnum and the scaphoid and semilunar bones," and the os magnum may be forced up. The injury is caused by forced flexion of the wrist.

Symptoms and Treatment.—The symptom of dislocation of the carpal bones is a firm projection, which becomes more prominent during flexion of the wrist. The treatment is extension and manipulation, a bond splint being worn for three weeks.

In all dislocations of the metacarpal bones, the treatment is extension and manipulation, a straight splint well padded and a large pad for the palm, the splint to be worn for three weeks.

Dislocations of the phalanges may be complete or may be partial.

Treatment.—The treatment is extension and manipulation; wear a straight splint for one week.

In dislocation of the ribs and costal cartilages, diagnosis is rarely made, and the injury is treated as a fracture. The ribs may be dislocated from their cartilages, one or more ribs being displaced. The treatment is the same as for fracture of the ribs. The dressings are the same as those used in fractured sternum. Pick states that reduction is brought about by causing the patient to hold the chest full of air while efforts are made to push the cartilage into place. Dress the same as for fractured ribs.

Pelvic dislocations are almost always complicated with a fracture. They are caused by falls from a height or applying violent force to the acetabula. The dislocation may be up or down, front or back, and

may damage the urethra or the bladder. The patient can not stand. There are great pain and deformity. Treat by moulding the bones into place, by applying a pelvic belt, and by rest in bed for four weeks.

Dislocations of the sacroiliac joint are produced by falls. Movement on the part of the patient is difficult or impossible. There is violent pain, and often paralysis (from pressure upon nerves). In dislocation backward there is an apparent shortening of the leg, eversion of the foot exists, and the ilium moves posteriorly and upward. In dislocation forward the anterior superior iliac spine projects, and the pelvis is broadened. Sacroiliac dislocations are reduced by holding the pelvis firm, and making extension with a pulley. The patient stays in bed for four weeks, and wears a pelvic belt, as in fracture.

DISLOCATIONS OF THE FEMUR (HIP-JOINT).

These injuries are rare, as the hip-joint is very strong. They occur in young adults. In forcible extension the head of the femur presses against the capsule, but the capsule here is very thick, and certain muscles, the rectus, psoas, and iliacus, are pulled tight, and serve to strengthen the capsule. The head of the bone can not go directly upward, because of the acetabulum. (Edmund Owen.) The weak point of the acetabular rim is below. The weak part of the capsule is also below. Forced abduction is apt to take the head of the bone through the lower part of the capsule, a dislocation occurring primarily into the thyroid foramen. Four forms of hip-joint dislocation exist: First, upward and backward on the dorsum of the ilium; second, backward into the sciatic notch; third, downward into the obturator foramen; and, fourth, inward on the pubes.

DISLOCATIONS ON THE DORSUM OF THE ILIUM.

These comprise one-half of all hip dislocations, and are usually produced by some twisting movement of the body or limb when the latter is abducted, or from a crushing weight received when in a stooping posture (Fig. 47). The symptoms are: The flexed position of the thigh, the knee, when the patient stands, projecting in front of but above the other; the rotation inward of the limb, the great toe resting on the instep of the opposite foot; the projection of the great trochanter, and its approximation to the anterior-superior-spinous process of the ilium; the elevation of the fold of the buttock; the immobility of the limb, and the pain produced by any attempt to abduct or to extend it; and the marked shortening of the limb, from an inch and a half to two and a half inches. (Bryant.)

DISLOCATION UPON THE FORAMEN OVALE, OR OBDURATOR FORAMEN.

This is a very striking accident. Sedillot, as well as Boyer, believes that it is the most common of all forms. In Bryant's table it stands second. It is generally caused by some forced abduction of the

knee or foot, the head of the bone being tilted inward. It is characterized by the bent position of the body, and the pointing of the foot forward and slightly outward, the approximation of the trochanter towards the mesial line and consequent flattening of the hip, hollowness below the anterior-superior-spinous process of the ilium, the absence of the gluteal fold, and the elongation of the limb from one to two inches. Any attempt at movement causes pain. The head of the bone can be felt in its new position beneath the adductor muscles.

Diagnosis.—The diagnosis from intracapsular fracture is obtained by noting the inversion, the great shortening, the absence of crepitus, the age of the subject, and the nature of the force. The nature of the force, the inversion, and the absence of crepitus mark the diagnosis from extracapsular fracture.

Treatment.—Bigelow states: "The obstacle to reduction in dislocation on to the dorsum of the ilium, is the untorn portion of the capsule, especially the V-ligament. The ilio-femoral, V, or Bigelow's ligament, resembles an inverted V, arises from an interior inferior spine of the ilium, is inserted into the anterior intertrochanteric line, and is incorporated into the front of the capsule. To reduce a dislocation, this ligament must be relaxed by manipulation or be torn by extension. Manipulation makes the head of the bone retrace its steps over the same route it took in emerging. Give ether; place the patient supine upon a mattress on the floor; flex the leg on the thigh to relax the hamstrings, the thigh on the pelvis; increase the adduction over the middle line; strongly abduct; perform external rotation and extension. This treatment may be summed up as flexion, adduction, external circumduction, and extension, or, as Pick puts it, 'Bend up, roll out, turn out, and extend.' If manipulation fails, try extension. A perineal band is fastened to the wall, and extension by pulleys is made in the axis of the deformed limb, that is, across the lower third of the other thigh (Fig. 48), or a right angle to the body, while the patient lies upon the sound side. After reduction, put the patient to bed, and use sandbags (as in fracture of the hip) for four weeks. Passive motion is made in the third week."

DISLOCATION INTO THE SCIATIC NOTCH.

The head of the bone passes backward and a little upward, and rests upon the ischium at the margin of the sciatic notch (not in the notch), below the tendon of the obturator-internus muscle. The causes are the same as those given for previous dislocation.

Symptoms.—There are flattening and broadening of the hip; ascent of the trochanter above Nelaton's line, shortening to the extent of an inch, flexion, inward rotation, and adduction exist; but the axis of the femur of the injured side passes through the knee of the sound side, and the ball of the great toe of the injured side rests upon the great toe of the sound side (Fig. 49). Other symptoms are identical

with dislocation upon dorsum of the ilium, but are less pronounced. Allis' signs of this dislocation are of value. If, with the patient recumbent, the thighs are brought to a right angle with the body, shortening on the affected side is materially increased; if the dislocated thigh is extended, the back arches as in hip-disease.

Treatment.—The treatment is the same as for dislocation backward upon the dorsum of the ilium (Fig. 50).

DOWNWARD DISLOCATION INTO THE OBTURATOR FORAMEN.

"This is the primary position of most dislocations of the hip, the bone rarely remaining in the thyroid foramen, but usually mounting up as a result of muscular action or the initial violence. The cause is violent abduction by falls or by stepping from a moving car.

"*Symptoms.*—Dislocation downward into the obturator foramen is indicated by flattening of the hip. The head of the bone is felt in its new position, and is missed from the acetabulum; rigidity except in the direction of deformity; a hollow over the great trochanter, which process is well below Nelaton's line, and nearer the normal to the middle line; the gluteal crease is lower than is the crease of the opposite side; lengthening to the extent of one to two inches; the body is bent forward by traction upon the psoas and iliacus muscles, and is also deviated to the side, thus causing great apparent lengthening. The limb is advanced and abducted, and the foot is pointed straight ahead or is a little everted (Fig. 51). When the patient is recumbent, extension is impossible, the knees can not be pushed together without great pain, and the adductor muscles are hard and rigid. Unreduced dislocations do well, the patient obtaining a very useful hip-joint." (Sedillot.)

Treatment.—In treating dislocation downward into the obturator foramen, effect reduction, if possible, by manipulation, and if this fails, by extension. To reduce by manipulation, flex the leg on the thigh and the thigh on the pelvis, and then perform in the following order, abduction, internal circumduction, and extension. If extension is used, employ a pelvic band to pull the pelvis toward the sound side, and a perineal band beneath the pelvic band, having pulleys to maintain force upward and outward from the injured hip. The surgeon, grasping the leg and ankle, drags the member inward, and pries the femur into place (Fig. 52). The after-treatment is the same as that for the previous forms.

Symptoms of Pubic Dislocation.—The head of the bone can be felt and seen in its new position; the hip is flattened; there is a hollow over the great trochanter, this process being found below the anterior superior spine of the ilium; there is shortening to the extent of an inch; the limb is in abduction with eversion (Fig. 53), and the knees can not be aproximated without great pain.

Treatment.—The treatment of pubic dislocation is manipulation, as performed for thyroid dislocation. The limb is well abducted,

extension is made downward and backward, and the head of the femur is pulled outward by a towel around the thigh, just beneath the groin

Fig. 47. — Hip-joint Dislocation: Upward, or on the Dorsum of the Ilium. (Cooper.)

Fig. 48.—Reduction of Dislocation on the Dorsum of the Ilium by the Pulleys. (Cooper.)

Fig. 50.—Reduction of Dislocation into the Sciatic Notch by the Pulleys. (Cooper.)

Fig. 49. — Hip-joint Dislocation: Backward, or into the Sciatic Notch. (Cooper.)

Fig. 51. — Hip-joint Dislocation: Downward, into the Obturator or Thyroid Foramen. (Cooper.)

Fig. 52.—Reduction of Dislocation into the Obturator Foramen by the Pulleys. (Cooper.)

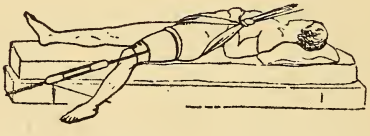

Fig. 54.—Reduction of Dislocation on the Pubes by the Pulleys. (Cooper.)

Fig. 53. — Dislocation on the Pubes. (Cooper.)

(Fig. 54; Cooper). The after-treatment is the same as that for the previous forms.

DISLOCATIONS OF THE KNEE.

There are four forms,—forward, backward, inward, and outward. They may be complete or incomplete; the most common dislocations are lateral. The cause is violent force, such as a fall, or in jumping from a moving train, or in being caught by the foot and dragged.

Diagnosis.—When the popliteal artery or vein is injured or ruptured, amputation of the limb may be called for, this necessity being rendered more than probable when the circulation through the vessels is not speedily restored after the reduction of the dislocation, or when a swollen condition of the limb remains.

Treatment.—These dislocations are readily diagnosed by the peculiar deformity they display, and are easily reduced by extension and the application of pressure where pressure is needed. After the parts have been replaced in their normal position, splints should be adjusted and cold applied, for secondary inflammation is almost sure to follow. In some cases fracture coexists, and in exceptional examples, where the end of the diaphysis projects through the soft parts, its resection may be required to allow of its reduction. (Bryant.)

DISLOCATION OF THE HEAD OF THE FIBULA.

This accident is sometimes met with. Its nature can be readily recognized by the projection of the bone. It should be treated by the application of a pad and pressure over the part sufficient to keep the bone in its place, the limb being flexed when necessary, to relax the biceps femoris muscles. The pressure should be maintained for at least two months if good success is to be looked for. As a rule, the bone never quite resumes its former position, the head projecting more than usual. "This deformity, however, does not appear to weaken the limb to any great extent."

Dislocation of the Interarticular Fibro-cartilages (Semilunar).—This is a recognized accident. It is produced by some sudden twist of the knee with the foot everted, and generally in subjects who have relaxed joints or such as have been the seat of some chronic synovitis. The inner cartilage seems more liable to displacement than the outer.

Symptoms.—The symptoms of the accident are well marked. A patient when walking, accidentally catches his foot against a stone, or in rising from a kneeling position is seized with a sudden sharp, sickening pain in the knee; the joint becomes at once fixed in a semi-flexed position, and any attempt to move it only excites some pain. When the first pain has subsided, a painful spot is usually left, where the projecting cartilage may be felt, or even seen; and if the "internal derangement of the joint," as it was originally called, is left untreated, synovitis or effusion into the joint will soon show itself.

Treatment.—"The best practise consists in the forced flexion of the joint, the slight rotation of the leg outward, and sudden extension, pressure with the thumb upon the cartilage above the edge of

the inner condyle of the tibia during the flexion and extension often being of use. When success attends this maneuver, the joint moves smoothly and without pain, and the patient will at once be able to move the joint freely. After its reduction, the joint should be kept in a splint, and such means employed as the symptoms that follow indicate; for more or less inflammation often ensues, requiring ice, cold lotions, leeching, and rest. When active symptoms have subsided, it is well to restrain the movements of the joint by means of a knee-cap or strapping, as a recurrence of the accident is liable to follow upon the least occasion.

"*Dislocations of the Ankle-joint.*—Such an accident uncomplicated with rupture is rare; that is, dislocation of the foot outward is generally associated with fracture of the fibula, and dislocation inward with fracture of the tibia, or both malleoli may be broken. However, pure dislocation of the foot forward or backward may occur.

"*Treatment.*—The lateral displacements of the foot are not difficult of reduction by extension and well-directed manipulative force. The flexion of the knee facilitates this operation by relaxing the muscles of the calf.

"To keep the bones in position, a flat posterior splint extending up to the popliteal space, with foot-piece and two side splints, all well padded, are, as a rule, sufficient, the surgeon using his judgment as to the amount of pressure and padding that may be demanded. In some cases where it is very difficult to keep the parts quiet, from the action of the gastrocnemii muscles, the tendo Achillis should be divided, the foot after this simple operation being perfectly passive and entirely in the hands of the surgeon to place and to keep in any required position." (Bryant) The limb should subsequently be slung in a proper swing, Salter's being the best. In hospital practise, two or more pieces of bandage slinging the splints to the cradle will answer well. In displacement of the foot forward or backward the same kind of treatment is applicable, but in these accidents it is expedient, as a rule, to divide the tendo Achillis at once. This should be done at any rate when the slightest disposition to displacement is found to exist, the treatment of the case being by this operation rendered more simple and certain.

The splints should be retained for at least six weeks, and afterward passive movement should be allowed. The patient should not bear any weight on the limb for another month.

Dislocation of the Tibia and Fibula at Their Lower Articulation, with a Forcing of the Astragalus Upward between the Two Bones.—This is an accident produced usually by a jump from a height on the foot or feet. This dislocation may be diagnosed from displacement at the ankle-joint and dislocation of the astragalus itself by the fact that extension and flexion are present; from fractures about the ankle by the absence of crepitus, together with the positive signs of the injuries themselves.

Treatment.—Anesthetize the patient, and reduce by extension and manipulation. Success may be looked for. When difficulties are experienced, Turner's suggestion of dividing the tendo Achillis, or any other tendon when it is clearly interfering with replacement of the bones, should be followed. When these means fail, the case should be treated as one of a compound nature, and the astragalus is partially excised, the foot being subsequently well confined in splints, and ice applied. Occasionally amputation may be demanded.

Dislocation of the Astragalus.—The astragalus may be displaced from the bones of the leg, and at the same time be separated from the rest of the tarsus. The displacement may be forward, backward, outward, inward, or rotary. Dislocation of the astragalus is caused by falls or twists.

Symptoms.—In forward dislocation the astragalus projects strongly; there is shortening of the foot, and the malleoli approach the plantar aspect of the foot; the foot is deviated to one side or to the other, and there is absolute rigidity of the ankle-joint. In backward dislocation of the astragalus the foot is not deviated to either side; the astragalus projects between the malleoli and above the os calcis, and the tendo Achillis is stretched over the projection. Rigidity is absolute.

Treatment.—In treating astragalus dislocation, reduce under ether by flexing the knee to relax the gastrocnemius muscle, extending the foot, and pushing the bone into place. It may be necessary to cut the tendo Achillis. After reduction, put up the foot and leg in silicate of soda dressing for two weeks, and then begin passive motion and apply side splints, which are to be worn for one week more. If reduction fails, support the limb on splints, combat inflammation, and endeavor to bring about union between the dislocated bone and the tissues. Often in unreduced dislocation, the skin sloughs over the projecting bone. Excision is demanded the moment sloughing is seen to be inevitable. Cases of compound dislocation of the astragalus require immediate excision. (Da Costa.)

Dislocations of the Phalanges.—These are very rare. The first phalanx of the big toe is the one most liable to dislocation.

Symptoms and Treatment.—Dislocations of the phalanges are obvious. The treatment is by reduction; immobilize for two weeks.

CHAPTER LXV.

FOODS AND FOOD PREPARATION.

ELEMENTARY COMPOSITION OF FOOD (THOMPSON).

Of the seventy-three chemical elements, thirteen enter uniformly into the composition of the body, and ten more are occasionally found. Of all these, several exist in very small proportion, and their uses are unknown; several are found more abundantly, but are not indispensable to life; and certain elements, namely, carbon, hydrogen, oxygen, and nitrogen, are necessary ingredients of tissues of the body. These elements form compounds, which, as they occur in the structures of the various tissues, have the following characteristics:—

First, although the elements are but few in number, their molecular arrangements are very complex.

Second, their compounds are comparatively unstable, and are readily converted in the body or by chemical analysis into other forms.

All foods are composed of combinations of these simpler chemical elements, which, for the most part, must be subjected to alteration in the body itself to prepare them for assimilation by the tissues. The nutrition of the body, therefore, involves several distinct processes, viz.:—

1. The secretion of digested fluids, and their action upon food in the alimentary canal.

2. The absorption of the ingredients of the food, when digested, into the blood and lymphatic vessels.

3. The assimilation of the absorbed nutritious products by the tissues.

4. The elimination of the waste material.

The following analysis exhibits admirably the relative predominance of the elements of which the human body is composed:—

APPROXIMATE ANALYSIS OF A MAN (MOSS).

(Height, 5 feet 8 inches; weight, 148 pounds.)

Oxygen	92.4 pounds
Hydrogen	14.6 pounds
Carbon	31.6 pounds
Nitrogen	4.6 pounds
Phosphorus	1.4 pounds
Calcium	2.8 pounds
Sulphur	.24 pounds
Chlorine	.12 pounds

Sodium	.12	pounds
Iron	.02	pounds
Potassium	.34	pounds
Magnesium	.04	pounds
Silica	2	pounds
Fluorine	.02	pounds
Total	148.00	pounds

All these elements are necessarily derived from food plus the oxygen of the air that we breathe. The three predominating elements —oxygen, hydrogen, and carbon—are the great force producers of the body, although they are tissue formers as well, and to them must be added nitrogen, as serving in this double capacity, although its relation to tissue formation and renewal is greater than its capacity for supplying energy.

The common elements which enter into tissue formation chiefly, and which bear no direct relation to the main sources of the force production in the body, are chlorine, sulphur, phosphorus, iron, sodium, potassium, calcium, and magnesium in different combinations. Bone tissue, for example, contains about fifty per cent of lime phosphate. If this substance is deficient in the food of the young, growing infant, the bones are poorly developed, and so soft that they yield to the strain of the weight of the body, and become bent and out of shape. This constitutes one of the principal symptoms of rickets.

Lack of iron salts in the food impoverishes the coloring matter of the red blood-corpuscles, on which they depend for their power of carrying oxygen to the tissues, and anæmia and other disorders of deficient oxidation result.

The lack of sufficient potash salts, especially potassium carbonate and chloride, is a factor in producing scurvy, and the condition is aggravated by the use of common salt (Nace). A diet of salt meat and starches may cause it, with absence of potatoes and fresh fruits and vegetables.

The lack of sodium chloride interferes with many of the functions of the body immediately concerned with nutrition, such as absorption (osmosis), secretion, etc., and alters the density and reactions of the different fluids.

These few illustrations suggest the diversity of roles exhibited by the elements, and the need for a correctly-balanced diet. In order to determine what such a diet should consist of, it is necessary to study the value of the principal classes of foods in force production, and in nutrient power or tissue building; but before proceeding further with this discussion, it will be advisable to adopt a simple, comprehensive classification of the foods in general use by man. The following table of analyses, made by Dujardin-Beaumetz, is quoted by Yeo, to show the proportion of nitrogen present in different foods, and also the combustible carbon and hydrogen.

"The hydrogen existing in the compound in excess of what is required to form water with the oxygen present is calculated as carbon. It is only necessary to multiply the nitrogen by 6.5 to obtain the amount of dry proteids in 100 grams of the fresh food substance."

	Nitrogen.	C+H. Combustibles Calculated as Carbon.
Beef (uncooked)	3.00	11.00
Roast beef	3.53	17.76
Calf's liver	3.09	15.68
Soie-gras	2.12	65.58
Sheep's kidneys	2.66	12.13
Skate	3.83	12.25
Cod, salted	5.02	16.00
Herring, salted	3.11	23.00
Herring, fresh	1.83	21.00
Whiting	2.41	9.00
Mackerel	3.74	19.26
Sole	1.91	12.25
Salmon	2.09	16.00
Carp	3.49	12.10
Oysters	2.13	7.18
Lobster (uncooked)	2.93	10.96
Eggs	1.90	13.50
Milk (cow's)	0.66	8.00
Cheese (Brie)	2.93	35.00
Cheese (Gruyere)	5.00	38.00
Cheese (Roquefort)	4.21	44.44
Chocolate	1.52	58.00
Wheat (hard southern, variable, average)	3.00	41.00
Wheat (soft southern, variable, average)	1.81	39.00
Flour, white (Paris)	1.64	38.50
Rye flour	1.75	41.00
Winter barley	1.70	44.00
Maize	2.20	42.50
Buckwheat	1.80	41.00
Rice	1.95	44.00
Oatmeal	1.08	29.50
Bread, white (Paris, 30 per cent water)	1.07	28.00
Bread, brown (soldiers' rations formerly)	1.20	30.00
Bread, brown (soldiers' rations at present)	1.20	30.00
Bread from flour of hard wheat	2.20	31.00
Potatoes	0.33	11.00

Beans	4.50	4.02
Haricots (dry)	3.92	43.00
Lentils (dry)	3.87	43.00
Peas (dry)	3.66	44.00
Carrots	0.31	5.00
Mushrooms	0.60	4.50
Figs (fresh)	0.41	15.50
Figs (dry)	0.92	34.00
Coffee (infusion of 100 grams)	1.10	9.00
Tea (infusion of 100 grams)	1.00	10.50
Bacon	1.29	71.14
Butter (fresh)	0.64	83.00
Olive-oil	Trace	98.00
Beer, strong	0.05	4.50
Wine	0.15	4.00

To estimate the equivalent chemical elements in the different classes of food, Parker gives the following simple rules:—

1. To obtain the amount of nitrogen in proteid foods, divide the quantity of food by 6.30.
2. To obtain the carbon in fat, multiply by .79.
3. To obtain the carbon in carbohydrate foods, multiply by .444.
4. To obtain the carbon in proteid foods, multiply by .535.

Estimates vary somewhat as to the average quantity of the elements—carbon and nitrogen—consumed per diem. In a general way it may be said that the consumption of carbon is 320 grams, and that of nitrogen about 20 grams.

The quantity of food required to maintain the body in vigor depends upon the following conditions:—

(1) External temperature; (2) climate and season; (3) clothing; (4) occupation, work, and exercise; (5) the state of individual health; (6) age; (7) sex.

In civilized communities, where cooking is a fine art, the variety of food preparations is so great that the appetite is often stimulated beyond the requirements of the system, and consequently more food is eaten than is necessary or desirable to maintain the best standard of bodily health and vigor.

Persons in this country who live in comfortable circumstances, often eat a dozen or fifteen ounces of solid food at breakfast, and again at luncheon, and perhaps thirty ounces more at dinner, making a total of, say, fifty-five or sixty ounces, to which are added only fifty or fifty-five ounces of fluids. This is about a third more than the amount of solids actually needed, forty ounces of solid food (which equals twenty-three ounces of water-free food) being a fair average for the daily necessities of most persons, one-fourth of which should be animal and three-fourths vegetable food. People eat too much, and drink too little fluid in proportion.

Water, estimated as a force producer within the body, may be said to have comparatively little value. Much of the water which is either drunk or ingested in combination with foods passes through the body unchanged, and is eliminated from one or more of the excreting surfaces; but some of it is undoubtedly altered or split up into elements which unite with other compounds. The nature of these processes is obscure, and as yet very little understood. It is believed, also, that a certain quantity of water is produced in the body by the union of oxygen and hydrogen, which occurs incident to other chemical change, or by the liberation of water from more complex molecules. Water is entitled to rank as a food, because it enters into the structural composition of all the tissues of the body, and, in fact, constitutes rather more than two-thirds (70 per cent) of the entire body weight. Its importance is readily appreciated after it has been withheld from the diet for a short time, when striking physical and physiological alterations in the functions of the body occur.

Yeo says that "assuming the water-free food to be 23 ounces, and a man's weight to be 150 pounds, each pound weight of the body receives in twenty-four hours .15 ounces, or the whole body receives nearly a hundredth part of its own weight. But ordinary solid food contains usually between 58 and 60 per cent of water; and if we add this to the water-free solids, the total daily amount of so-called dry food (exclusive of liquids) is about 48 to 60 ounces. But from 50 to 80 ounces of water in the liquid form is usually taken in addition, and this would make the total supply of water equal 70 to 90 ounces, or half an ounce for each pound of body weight."

Gluttony results in overdevelopment and overwork of the digestive apparatus. The stomach and bowels become enlarged, the liver is engorged, and a predisposition is established to degenerative changes, fatty heart, etc.

Overeating and overdrinking may both be, first, temporary, that is, the result of an occasional debauch; or, second, chronic.

Temporary overeating may apply to the excessive consumption of a mixed diet, or of a particular article of food. The former causes dyspepsia, or, in extreme cases, acute gastro-enteritis. The latter may also cause dyspepsia and diarrhea, or such affections may be produced as glycosuria, from excessive indulgence in candy and sweets; acne and other skin diseases, from the too liberal consumption of fats.

Temporary overeating at one or two meals may not produce any serious effect, but if the excess in feeding be long continued, a variety of ills results, attributable directly to the overloading of the alimentary canal, and to the accumulation of waste matter in the tissues, and consequent imperfect oxidation processes.

The excess of food may be injurious in one or two ways:—

First, if it is not absorbed, it ferments abnormally in the alimentary canal. There is a limit to the quantity of every food which

can be digested in a given time; beyond this, the food, whether starches, fats, sugar, or proteids, may decompose, or pass away unaltered.

Second, if the excess is absorbed, the blood is overwhelmed, and the excretory organs are overworked.

Chronic overeating may cause such diseases or diatheses as obesity, gout, lithemia, oxaluria, and the formation of renal, vesical, and hepatic calculi. It is very certain to cause congestion of the liver, and the condition known as biliousness, in which the stomach and intestines are engorged; constipation results; the tongue is heavily coated; the bodily secretions are altered in composition, the urine especially becoming overloaded with salts; the liver becomes congested; and finally the nerves and muscular system are affected, with, as a result, headache and feelings of fatigue, lassitude, drowsiness, and mental stupor.

For persons leading sedentary lives, the excessive consumption of animal food is said to be more injurious than vegetable food, for the reasons given above, although obesity is more likely to result from excess in a vegetable diet and sweets. The nitrogenous foods, requiring, as they do, a large consumption of oxygen for their complete combustion and reduction to urea and allied products, produce forms of waste matter in the system which are more deleterious than carbohydrates, that are converted into water and carbonic acid, and are more easily eliminated. It is for this reason that defective nitrogenous metabolism alters the composition of the blood, and paves the way for disorders of nutrition, such as lithiasis.

The presence of intestinal round-worms and tapeworms may give rise to overeating, though this by no means always follows.

Overeating not only taxes the digestive system, but, what is often more serious, it throws too great a strain upon the glandular and excretory organs, especially the liver and kidneys, and if the habit is long continued, disease of the nature above described inevitably results. Overeating, especially among the well-to-do, is the commonest dietetic error, and, looking at the question in its broadest aspects, it is quite certain that the foundation for more disease is laid by this habit than by overdrinking. The former, indeed, sometimes conduces to the latter, and there are some examples of alcoholism in which desire for drink is only aroused and fostered by previous excesses in eating.

Overdrinking, except of alcohol, is not common, and is mainly confined to the excessive consumption of tea and coffee, which results in insomnia, cardiac palpitation, and various neuroses in some cases. Dilatation of the stomach has been attributed in some cases to over-indulgence in mineral waters, but such instances are very unusual. Excessive use of milk as a beverage usually results in biliousness and constipation, for the reason that it is really a solid food, that is, it becomes such immediately on entering the stomach. Thirst is often extreme in fevers, diabetes, and other conditions; but the drinking of exceptionally large quantities of water is by no means always harmful, and it is often desirable to recommend it as a diluent and diuretic.

FOOD CLASSIFICATION.

Foods are classed in accordance with their general physical properties, first, into solid, semisolid, and liquid foods; secondly, into fibrous, gelatinous, starchy, oleaginous, and albuminous foods.

A subdivision sometimes used is that of the "complete" foods, such as eggs and milk, which in a single article comprise all the necessary ingredients and elements to support life; and "incomplete" foods, which are capable of maintaining life but a comparatively short time.

Foods may be classed as to their source, primarily into animal and vegetable foods. Animal food consists of meat, fowl, fish, shellfish, and crustaceans, eggs, milk, and its products, and animal fats. The vegetable foods are subdivided into cereals, vegetables proper, fruits, sugars, vegetable oils.

The simplest chemical classification possible is that advocated by Baron von Liebig, who was the first to suggest a really scientific division of foods. He grouped all foods into two classes, (*a*) nitrogenous; (*b*) non-nitrogenous.

Each of these classes contains food material derived from both the animal and the vegetable kingdom, although the majority of the animal substances belong to the nitrogenous, and the majority of vegetable substances to the non-nitrogenous group.

(*a*) The nitrogenous group Von Liebig regarded as containing plastic elements, *i. e.,* they are essentially tissue builders or flesh formers.

Nitrogenous foods are sometimes called "ozonized" foods, or albuminoids, that is, substances resembling albumin. They consist chiefly of the four elements,—carbon, oxygen, hydrogen, and nitrogen,—to which a small proportion of sulphur and phosphorus are usually joined. These elements for the most part are combined as some form of albumen.

Nitrogenous or proteid foods are non-crystallizable, but coagulable, principally fluid or semisolid substances. They are fermentable, and under some conditions will putrefy.

The nitrogenous group comprises all forms of animal food, except fats and glycogen. It includes, therefore, albuminoids and gelatins. Its chief representatives are milk, eggs, crustaceans, fish, shellfish, flesh, and fowls. It also contains such nitrogenous substances as occur in the vegetable kingdom, or vegetable albuminoids.

(*b*) The second, or non-nitrogenous group, Von Liebig calls "respiratory or calorifacient foods," because their function in the body is to furnish the fuel, or maintain animal heat. Since this original classification was suggested, it has been established that the non-nitrogenous aliments supply energy as force, manifested through muscular action; hence they are also called "force producers," in distinction from the nitrogenous tissue formers.

This is a convenient distinction to adopt, but it must not be held too absolutely; for in emergencies the tissue builders are used as force producers and heat givers as well.

The non-nitrogenous group contains, strictly, only the three elements—carbon, hydrogen, and oxygen—although various salts are mixed with both vegetable and animal foods. It includes all forms of vegetables and fruits, cereals, starches, sugars, gums, fats, and oils, which are both animal and vegetable, and also organic acids. Many vegetables, and some fruits, contain considerable nitrogen. Many of the vegetables, and, in fact, all the starch granules, contain a proportion of nitrogenous material, which is chiefly used in the formation of outside covering, whose purpose is to give protection, and afford firmness of resistance, to a softer pulp within.

Neither is animal food, on account of its fat and glycogen, strictly nitrogenous; nor is vegetable food, owing to its albuminoids and other forms of proteids, strictly non-nitrogenous; yet this classification is a very convenient and simple one, and has met with general acceptance. It will be used in this chapter, with the understanding that it has only a general and not too literal application; and, unless otherwise distinctly specified, "nitrogenous food" will be understood to include animal food, and "non-nitrogenous food" to include vegetable foods of all kinds.

TABLE OF COMPOSITION OF SOME COMMON FOODS.

(*Hofman.*)

	Nitrogenous Constituents.	Fat.	Carbohydrates.	Salt.	Total.
Fat beef	51.4	45.6	.....	3.0	100
Lean beef	89.4	5.5	.....	5.1	100
Pea flour	27.3	.8	68.9	3.0	100
Wheat	16.6	.9	81.9	.6	100
Rice	7.7	.4	91.2	.7	100

TABLE OF COMPOSITION OF COMMON FOODS.

(*From Parker.*)

Articles.	Water.	Proteids.	Fats.	Carbohydrates.	Salts.
Beefsteak	74.4	20.5	3.5	.....	1.6
Fat pork	39.0	9.8	48.9	.....	2.3
Smoked ham	27.8	24.0	36.5	.....	10.1
White fish	78.0	18.1	2.9	.....	1.0
Poultry	74.0	21.0	3 8	.....	1.2
White wheat bread	40.0	8.0	1.5	49.2	1.3
Biscuit	8.0	15.6	1.3	73.4	1.7
Oatmeal	15.0	12.6	5.6	63.0	3.0
Maize	13.5	10.6	6.7	64.5	1.4
Macaroni	13.1	9.6	.3	76.8	.8
Arowroot	15.4	.8	.....	83.3	.27
Pear (dry)	15.0	22.0	2.0	53.0	2.4
Potatoes	74.0	2.0	.16	21.0	1.0
Carrots	85.0	1.6	.25	8.4	1.0
Cabbages	91.0	1.8	5.0	5.8	.7
Butter	6.0	.3	91.0	.....	2.7
Eggs ($\frac{1}{10}$ for shell)	73.5	13.5	11.6	.....	1.0
Cheese	36.8	33.5	24.3	.	5.4
Milk (specific gravity 1032)	86.8	4.0	3.7	4.8	.7
Cream	66.0	2.7	26.7	2.8	1.8
Skimmed milk	88.0	4.0	1.8	5.4	.8
Sugar	3.0	.....	.....	96.5	.5

CHAPTER LXVI.

FORCE PRODUCTION—ENERGY FROM FOOD.

The two ultimate uses of all foods are to supply the body with material for growth or renewal, and with energy, or the capacity for doing work. The energy received in a latent form, stored in the various chemical combinations of foods, is liberated as kinetic or active energy in two chief forms: first, as heat; second, as motion. Force is the manifestation of energy. The force developed by a healthy adult man at ordinary labor averages 3.400 foot-tons *per diem,* a foot-ton being the amount of force required to raise a weight of one ton to the height of one foot. Of this, somewhat less than one-fifth is expended in motion, and somewhat more than four-fifths, or 2.840 foot-tons, in heat, which maintains the body temperature at its normal average.

A man weighing one hundred and fifty pounds, or over one-thirteenth of a ton, obviously expends considerable energy in merely moving his own body about from place to place, aside from carrying any additional burden.

The original force developed in the various functions of animal life, which results in heat production and motion, is chiefly obtained from the radiant heat of the sun stored by plants in the latent form of certain chemical compounds—chiefly starches and sugars—which, on being consumed as food by animals, furnish energy.

A useful comparison is made by Thompson between the processes of nutrition and development of energy in the human body, and the energy derived from a steam engine and boiler. In both cases, the source of energy is oxidation, and principally of carbon. In both cases, the latent energy of the carbon, liberated by oxidizing processes, is converted into heat and motion, forms of energy which bear a definite relation to each other.

If a large part of the original latent energy is converted into heat, less will yield motion, and conversely. The proportion of these two forces to each other is, in the case of the most perfectly constructed engine, about one of motion to eight of heat; whereas in the human body it was calculated by Helmholtz "that the motion obtainable from a given amount of food may stand in relation to the heat in proportion of one to five. Hence, as regards the production of work through motion, the human body is a more perfectly constructed machine than the engine. Furthermore, after combustion of the carbon by the fires of the boiler, a certain amount of waste matter, or ashes, is produced. If this is allowed to accumulate, it obstructs the draught, and interferes

with active oxidation. In the human body, in like manner, the fuel, or food, consumed, produces ashes, such as urea and other forms of waste material, which, if not removed, accumulate in the system, and embarrass or retard the normal oxidation processes. The body possesses the additional power of sorting and modifying the fuel food which it receives, so as to develop its energy to the best advantage in different organs.

"Whether elementary substances are burned outside of the body, or oxidized within the body, the resulting products are the same. There can be no loss of matter, and there can be no loss of energy. The matter is changed in form by molecular rearrangement; the energy is converted from one type into another. The following simple experiment will illustrate this point: In a large covered glass jar place an ounce of alcohol in a small metal vessel. Also place in the jar a little lime-water in a tumbler, and a thermometer. On igniting the alcohol and allowing it to burn away completely, a film of aqueous vapor will accumulate on the surface of the jar, and a film of calcium carbonate will form on the surface of the lime-water, produced by the union of carbonic-acid gas with the lime-water. The thermometer will indicate a rise in temperature of the air in the jar. An ounce of alcohol consumed as food will be similarly converted into carbonic-acid gas and water, and in the process in the body, heat will be increased." No substance is a good food unless it fulfils two conditions, viz., easy assimilation and complete combustion.

The relative importance of the different food fuels should be considered. This is well summarized by Woodruff:—

"For instance, cut off the supply of oxygen, and death ensues in from one to ten minutes. If water is withheld, preventing the transportation of the fuel and oxygen to various parts of the body, death follows in about two to seven days or more, according to climate, exposure, and exercise. If the fuel itself is taken away, death follows in from seven to forty days or more, according to the amount of exposure that would abstract heat and the amount of work that would use up the energy already stored up in the body. If material for the repair of tissue be excluded, death follows in a variable time, dependent upon the importance of the tissue that is being starved—a time varying from a week, if all nitrogen is excluded, to several months if the vegetable acids are excluded, or even to several years if certain more obscure substances are withheld. It still remains extremely difficult in the case of all foods to trace their final uses in the body, and determine with any approach to accuracy what proportions of each furnish respectively energy, repair of tissue, and heat; for there are no more complex chemical processes known than those of tissue metabolism."

STIMULATING FOODS.

In the broadest sense, all food is stimulating to the functional activity of the body; but when the digestive and assimilative powers

are lowered, less variety and less quantity of food can be tolerated, and foods that in health are never needed may become necessities; such foods, for example, are cod-liver oil, and the various preparations of meat, such as albumoses, peptones, meat juice, etc.

Certain food substances have a distinctly stimulating action at all times. The various condiments possess a local action of this kind upon the alimentary organs, but not a general or systemic action. The latter stimulation, manifested especially upon the nerve muscular apparatus, is derived from such substances as strong beef extracts, coffee, tea, and alcohol, all of which at times are of great service in the dietetic treatment of disease.

ECONOMIC VALUE OF FOOD.

We will not discuss the details of the economic value of foods, but brief reference to one or two facts will emphasize the importance of this topic.

The economic value of food is by no means to be estimated exclusively from its weight, and, as suggested by Williams, a pound of biscuit may contain more actual force-producing material than a pound of beefsteak, and yet the body may be able to assimilate more of the beefsteak and derive more energy therefrom; and it is the chemical processes of nature which convert such substances as grass, which are not assimilable by the human organism, into the flesh of the ox, which is readily digested by man.

It is economical for contractors employing large bodies of men in manual labor to see that they are well fed; for much more work, proportionately, will then be got from them.

Carbohydrates check albuminous waste and, like fats, yield both heat and mechanical work; hence good bread, sugar, and vegetables are all economical foods for the laborer. Unlike the other classes of foods, however, they do not produce muscle, and do not enter into the actual structure of the tissues to any great extent, although the carbohydrates may be found existing as glycogen in some of the tissues, like the muscles and liver. In general, they are said to be more easily metabolized than fats or proteids.

The following tables give a fair conception of the economic value of common foods in relation to their waste residue and capacity for producing work:—

THE RELATIVE VALUE OF FOODS.

(*Scammell.*)

(*The figures represent percentage.*)

Articles.	As Material for the Muscles.	As Heat Givers.	As Food for Brain and Nervous System.	Water.	Waste.
Wheat	14.6	66.4	1.6	14.0	3.4
Barley	12.8	52.1	4.2	14.0	16.9
Oats	17 0	50.8	3.0	13.6	16.9
Northern corn	12 3	67.5	1.1	14.0	5.1
Southern corn	34.6	39.2	4.1	14.0	8.1
Buckwheat	8.6	53.0	1.8	14.2	22.4
Rye	6.5	75.2	0.5	13.5	4.3
Beans	24.0	40.0	3.5	14.8	17.7
Peas	23.4	41.0	2.5	14.1	19.0
Lentils	26.0	39.0	1.5	14.0	19.5
Rice	5.1	82 0	0.5	9.0	3.4
Potatoes	1.4	15.8	0.9	74.8	7.1
Sweet potatoes	1.5	21.8	2.9	67.5	6.3
Parsnips	2.1	14.5	1.0	79.4	3.0
Turnips	1.2	4.0	0.5	90.4	3.9
Carrots	1.1	12.2	1.0	82.5	3.2
Cabbage	1.2	6.2	0.8	91.3	0.5
Cauliflower	3.6	4.6	1.0	90.0	0.8
Cucumber	0.1	1.7	0.5	97.1	0.6
Milk of cow	5.0	8.0	1.0	86.0	.....
Milk of human	3.0	7.0	0.5	89.5	.....
Veal	17.7	14.3	2.3	65.7	.....
Beef	19.0	14 0	2.0	65.0	.....
Lamb	19.6	14.3	2.2	63.9	.....
Mutton	21.0	14.0	2.0	63.0	.....
Pork	17 5	16.0	2.2	64.3	.....
Chicken	21.6	1.9	2.8	73.7	.....
Codfish	16.5	1.0	2.5	80.0	.....
Trout	16.9	0.8	4.3	78.0	.....
Smelt	17.0	Very little	5 or 6	75.0	.....
Salmon	20.0	Some fat	6 or 7	74.0	.....
Eels	17 0	"	3 or 4	75.0	.....
Herring	18.0	"	4 or 5	75.0	.....
Halibut	18.0	"	3 or 4	74 0	.....
Oysters	12.6	.....	0.2	87.2	.....
Clams	12.0	Very little	2 or 3	.....	.....
Lobsters	14.0	"	5 or 6	79.0	.....
Eggs (whites of)	13.0	.....	2.8	84.2	.....
Eggs (yolks of)	.....	29.8	2.0	51.3	.....
Butter	.....	100.0	.....	.....	.....
Artichokes	1.9	19.0	1.8	76.6	0.7
Asparagus	0.6	5.4	0.4	93.6	.....
Bacon	8.4	62.5	0.5	28.6	.....
Carp	18.0	0.8	2.9	78.3	.....
Cheese	30.8	28.0	4.7	36.5	.....
Cherries	0.6	21.0	1.0	76.3	1.1
Chocolate	8.8	88.0	1.8	.....	1.4
Cream	3.5	4.5	.....	92.0	.....
Currants	0.9	6.8	0.3	81.3	10.7
Dates (fresh)	.....	73.7	.....	24.0	2.3
Figs	5.0	57.9	3.4	18.7	15.0
Ham	35.0	32.0	4.4	28.6	.....
Horseradish	0 1	4.8	1.0	78.2	16.0
Kidneys	21.2	0.9	1.4	76.5	.....
Lard	.....	100.0	.....	.....	.....
Liver	25.3	3.9	1.2	68.6	.....

Articles.	As Material for the Muscles.	As Heat Givers.	As Food for Brain and Nervous System.	Water.	Waste.
Onions	0.5	5.2	0.5	93.8	.....
Pearl barley	4.7	78.0	0.2	9.5	7.6
Pears	0.1	9.6	.....	86.4	3.9
Pigeons	23.0	1.9	2.7	72.4	.....
Prunes	3.9	78.6	4.5	13.0	.....
Radishes	1.2	7.4	1.0	89.1	1.3
Suet	.....	100.0	.....	.....	.....
Venison	20.4	8.0	2.8	68.8	.....
Vermicelli	47.5	38.0	1.7	12.8	.....
Whey	.....	4.6	0.7	94.7	.....

ATKINSON'S TABLE OF DIGESTIBILITY OF NUTRIENTS OF FOOD MATERIAL.

In the food materials below of the total amounts of protein, fats, and carbohydrates the following percentages were digested:—

Material.	Protein.	Fats.	Carbohydrates.
Meat and fish	Practically all	79 to 92	.....
Eggs	"	96	.....
Milk	88 to 100	93 to 98	.....
Butter	.....	98	?
Oleomargarine	.....	96	.....
Wheat bread	81 to 100	?	99
Cornmeal	89	?	97
Rice	84	?	99
Peas	86	?	96
Potatoes	74	?	92
Beets	72	?	82

Bauer ("Dietary of the Sick") says: "The functional activity and resisting power of the organism seem to be essentially connected with the presence of an ample supply of albumin.

"Animal food requires a considerable quantity of oxygen for its complete combustion, and a diet of this nature increases the demand for oxygen and favors its consumption. Meat in general has a more stimulating effect upon the system, and is more strengthening than vegetable food, and it gives rise to sensations of energy and activity. A meal consisting of meat remains an hour or two longer in the stomach than a purely vegetable meal. It seems to satisfy the cravings of hunger, bulk for bulk, to a greater extent and for a longer time than vegetable food, and a man can live longer upon exclusively nitrogenous food than upon exclusively carbonaceous food. Animal food occupies less space in the stomach, and is more portable than vegetable food. Moreover, albuminous foods can be eaten longer alone without exciting loathing, as a rule, than can fats, sugars, or even some pure starches. In fact, there is a constant tendency to eat

too much meat, and when its effects are not counterbalanced by free outdoor exercise, it produces an excess of waste matter which accumulates and causes biliousness, and sometimes lithiasis, gout, etc."

Fothergill wrote: "In an excess of nitrogenized food we find the cause of much of the lithiasis, or gout, whether regular, irregular, or suppressed, with which we are brought into contact." A carbonaceous diet taxes the excretory organs to a lesser degree than animal food.

Sir H. Thompson says, "It is a vulgar error to regard it in any form as necessary to life." Nitrogenous food man must have, but it need not necessarily be in the form of meat, which "to many has become partially desirable only by the force of habit, and because their digestive organs have thus been trained to deal with it."

This is no doubt true; "but training has become so strongly a matter of heredity through many centuries that those who possess it are certainly in better health for a reasonable allowance of meat in their dietary." Errors in diet are far more common on the side of excessive meat-eating than the eating of too much vegetable food, especially among civilized communities. In the temperate an increase in prosperity, together with the improvements made in the methods of preparing and preserving meat, as well as those in breeding cattle for market purposes, tends to increase the habit of meat-eating. The estimate commonly given, in which meat should occupy one-fourth and vegetable food three-fourths of a mixed diet, is overstepped by many persons with whom the proportion may be two to four. There is often too much eating of cold meats at luncheon for the interest of health.

The proper association of different foods always keeps healthy men in better condition than too long continuance of any selected diet system.

Sir. H. Thompson, in speaking of the advantages of a well-proportioned diet, says: "A preference for high flavors and stimulating scents peculiar to the flesh of vertebrate animals, mostly subsides after a fair trial of milder foods when supplied in variety. . . . The desire for food is keener, the satisfaction in gratifying appetite is greater and more enjoyable, on the part of the general light feeder, than with the almost exclusive flesh feeder. . . . Three-fourths, at least, of the nutrient matters consumed are from the animal kingdom. A reversal of the proportions indicated—that is, a fourth only from the latter source, with three-fourths of vegetable products—would furnish greater variety for the table, tend to maintain a cleaner palate, increased zest for food, a lighter and more active brain, and a better state of health for most people not engaged in the most laborious employments of active life."

Letheby wrote: "The best proportions for the common wants of the animal system are about nine of fat, twenty-two of flesh-forming substances, and sixty-nine of starches and sugar. Whenever one kind of

food is wanting in any particular constituent, we invariably associate it with another that contains an excess of it."

Meats which are deficient in fat are usually eaten with added fat. Thus bacon is eaten with veal, liver, and chicken, and most fish are cooked with butter or oil. Similarly, butter, eggs, or cream are mixed with amylaceous foods, such as rice, sago, potatoes, etc., which are lacking in fat, and fat-containing cheese is added to macaroni. Bacon is added to beans, and pork to greens. A mixed diet is the only rational one for man, and it seems to be useless to reason otherwise.

The combinations of foods which are by analysis shown to contain quantities of proteids, starch, and fat, have a very different effect in overtaxing the digestive organs according to the particular form in which the ingredients exist.

It is a popular belief that meat requires more energy for digestion than starchy foods; but in health this is probably not true, provided both varieties of food are taken in correct proportion; for it certainly would be a strain upon the digestive system to be obliged to derive all the carbon needed from an exclusively meat diet, just as it overtaxes the alimentary canal to obtain sufficient nitrogenous material from an exclusively vegetable diet. The whole question devolves upon a true balance of ingredients of a mixed diet. (Thompson.)

For man, certainly, nature never intended that all the nutrition of the body should be derived from any one class of foodstuff, which would require the use of certain digestive juices, and imply the disuse of others which are normally present.

A diet of animal food is much less fattening than a vegetable regimen, or than carbohydrates with a fair proportion of fats; but a stout man will not necessarily endure fatigue, or even starvation, any better. On the other hand, to increase the proteid substances of the body, an albuminous diet, with but little carbohydrate, is necessary. Men, unless greatly emaciated, have a reserve store of energy in their bodies sufficient to maintain their animal heat and keep them alive for from seven to nine days, and this is true whether they have been meat eaters or vegetarians. Storage of fat will help them out in emergencies; but, if it has been overdone—*i. e.*, if there is too much fat in the tissues —they may be weakened by it, and, although they have the material for force production on hand, they are unable to utilize it, and are worse off than if they were spare.

Bauer says: "The material effects of albumin and fat in the system are in a certain sense opposed; for the former increases the tissue waste, and secondarily the oxidation, while fat induces the opposite effects."

VEGETARIANISM.

It is said by Bauer and others that the universal experience has been that, though an almost exclusively vegetable diet may keep a man in apparent health for some time, it eventually results in a loss of

strength and general resisting power against disease, which becomes evident after some months, if not before.

No doubt, much of the alleged benefit of vegetarianism is due to the greater freedom of the action of the bowels, induced by the use of bran bread and other coarse articles of food.

It is a known fact that it is impossible to subsist for any length of time on a diet which does not contain a considerable quantity of nitrogen, which constitutes so important an element in the composition of the great majority of structures of the body, and, in fact, of protoplasm itself.

"Attempts have, from time to time, been made, for economic reasons, to furnish large bodies of laboring men, employed by contracts or otherwise, with a purely vegetable diet; but this diet is found to defeat its own ends, in that the maximum of labor can not be maintained by men who are fed exclusively on vegetable food, although some carbohydrates are essential. It gradually induces a condition of muscular weakness and languor, with disinclination for either physical or mental work."

Animal food in some form must be regarded as absolutely essential for all races of men. When the diet of enthusiastic vegetarians is carefully analyzed, it is found that the strictly hydrocarbonaceous food is supplemented by such articles as milk, eggs, etc., which are used in cooking or in other ways, although the consumption of nitrogenous food may appear very much restricted.

There are many facts in nature, in addition to those already discussed, which indicate, without doubt, that man from his earliest prehistoric days has been omnivorous, adapting himself to his surroundings, and eating, in his primitive condition, whatever his environments afforded with least expenditure of labor to obtain it, now vegetable, now animal food. This is shown in the structure of the teeth in prehistoric skulls, in the length of the alimentary canal, and in the character of the digestive organs and secretions as at present existing.

The ancient Britons are known to have subsisted chiefly upon acorns, berries, roots, leaves, etc.; but other primitive tribes ate fish, shell-fish, and game when they could kill it.

WATER.

It is estimated that water composes about seventy per cent of the entire body weight, and it is an almost universal solvent. Its importance to the system, therefore, can not be overrated. The elasticity or pliability of muscles, cartilages, and tendons, and even of bones, is in great part due to the water which these tissues contain. As Solis-Cohen says: "The cells of the body are aquatic in their habit. The amount of water required by a healthy man in twenty-four hours is, on the average, between fifty and sixty ounces, besides about twenty-five ounces taken in as an ingredient of solid food, thus making a total of seventy-five to eighty-five ounces. The elimination of this water is

divided as follows: twenty-eight per cent through the skin; twenty per cent through the lungs; fifty per cent through the urine; two per cent through other secretions and the fæces." This is, of course, a very general computation, for there are constant variations in the activity of different organs.

A large proportion of the water is taken in the form of beverages composed chiefly of it, and by many persons they are substituted for plain water altogether. One of the most universal dietetic failings is neglect to take enough water into the system.

USES OF WATER IN THE BODY.

"The uses of water in the body may be summarized as follows:—

"1. It enters into the chemical composition of the tissues.

"2. It forms the chief ingredient of all the fluids of the body, and maintains their proper degree of dilution.

"3. By moistening various surfaces of the body, such as the mucous and serous membranes, it prevents friction, and the uncomfortable symptoms which might result from their drying.

"4. It furnishes in the blood and lymph a fluid medium, by which food may be taken to remote parts of the body and the waste matter removed, thus promoting rapid tissue changes.

"5. It serves as a distributor of body heat.

"6. It regulates the body temperature by the physical processes of absorption and evaporation.

"All protoplastic activity in cells ceases at once if they become dry. Elementary cells, such as the amœba, cease to move, to digest, or to show any form of irritability as functional activity, when dry; but if water be added to them, their functions will be resumed, showing that they have been suspended and not necessarily destroyed." (Thompson.)

The taking of much water into the stomach, by its mechanical pressure, excites peristalsis. One or two tumblerfuls of cold water taken into an empty stomach in the morning on rising favors evacuation of the bowels in this way. The water, moreover, is quickly absorbed, and temporarily increases the fulness of the blood-vessels. This promotes intestinal secretion and peristalsis. "The increased activity of the lower bowel is explained in this way rather than by the idea that the water itself reaches the colon and washes out its contents."

Lukewarm water acts as an emetic if drunk in large quantity. This action fails above 95° Fahrenheit and below 60° Fahrenheit, and is most efficient at about 90° Fahrenheit.

Water may be of service to eliminate waste in various renal diseases, gout, lithiasis, oxaluria, renal inadequacy, fevers, and infectious diseases. If drunk too freely with meals, it lessens the activity of saliva. Water drunk towards the conclusion of the gastric digestion of a meal (*i. e.*, two or three hours after taking food) serves to dilute the contents of the stomach, and wash them more readily into the intestines.

If stomach digestion has been slow and feeble, so that the whole process has been greatly prolonged, the drinking of six or eight ounces of water, either hot or cold, two hours or more after taking food, will facilitate its digestion. Water is highly useful in constipation, and it is more quickly absorbed from the stomach when the tension in the gastric vessels is low. It is imperatively needed after severe hemorrhage, or after the sudden loss of blood from the system from any cause, such as the evacuations of cholera morbus, Asiatic cholera, etc.

Water is to be restricted in dilatation of the stomach, the secretion of weak gastric juice, and sometimes, but not always, in diabetes insipidus, diabetes mellitis, ascites, and other dropsies, ansarca, and in some forms of heart disease and obesity. The daily quantity of water ordinarily drunk varies between two and a half and four pints. About one and a half pints more are taken in the food, and four or five and a half pints are therefore lost through the emunctories.

The foods which contain most water are milk, and succulent fruits, such as grapes, oranges, grapefruit, lemons, watermelons, etc., and vegetables like the tomato, squash, and many others of tropical origin.

EXCESS OF WATER.

If very large quantities of water, or any fluids consisting chiefly of water, are imbibed through a long period, they tend to overwork the kidneys and produce various alterations in the tissues. Practically, however, it seldom happens, excepting in some forms of gastric or intestinal disorders, and other instances mentioned above, that too much water is taken. When drunk in such fluids as beer or diluted liquors, the resulting disturbances of the system are attributable rather to other ingredients.

Laymen are usually more willing to ascribe obesity to supposed excessive consumption of fluids than to overeating. They often say that they supposed water was "fattening." It is so only in the sense that it promotes tissue change or metabolism, and washes away waste matter, not in the sense that it is itself a storage substance, as fat is.

WATER STARVATION.

When water is withheld from the system for a considerable length of time its absence is first apparent in the secretions and excretions, and next in the various tissues of the body, the last of all being those of the nervous system. More than ten or twelve hours of abstention from drinking produces uncomfortable thirst, and one or two hours of violent exercise may do so at once.

THIRST.

As far as the individual is concerned, the suffering from deprivation of water is mainly confined to the sensations of thirst and dryness of the mouth. Thirst is commonly, and somewhat erroneously, referred to the mouth and pharynx. It is true that the mucous membrane in these regions becomes dry when water is withheld, but thirst may also

be keen when these surfaces are abundantly moist. The sensation is the result chiefly of the expression through the nervous system of the need of the body tissues in general for fluid, and it is referred to the mouth and throat from force of habit, which associates the act of swallowing fluid, and the use of certain muscles in that process, with the subsequent relief of thirst. "It is asserted that shipwrecked sailors in open boats have relieved their thirst by immersing their bodies in salt water. Ordinarily, the skin is not capable of absorbing fluid of any kind to a practical extent, but immersion in water prevents evaporation from the surface of the body, and by saving its loss in that direction lessens thirst. Sucking a slice of lemon or drinking water acidulated with a few drops of lemon-juice or vinegar, sometimes allays thirst better than plain water. Lemon-juice and ice is another remedy. Bitartrate of potassium or very weak brandy may be used for the same purpose, and is sometimes more satisfying. Hot water, as hot as it can be sipped, quenches thirst much better than cold, which is of little avail." (Balfour.)

SALTS.

The principal salts derived from the food are as follows:—

Chloride of sodium and potassium; carbonates of sodium, potassium, and magnesium; sulphate of sodium and magnesium; phosphate of sodium, potassium, magnesium, and calcium. The majority of these salts are held to be unaltered by digestive processes, and pass into the blood or tissues without necessary chemical change.

USES OF SALTS IN THE FOOD.

The uses of the salts derived from the food are summarized as follows:—

1. To regulate the specific gravity of the blood and other fluids of the body.
2. To regulate the chemical reaction of the blood and the various secretions and excretions.
3. To preserve the tissues from disorganization and putrefaction.
4. To control the rate of absorption by osmosis.
5. To enter into the permanent composition of certain structures, especially the bones and teeth.
6. To enable the blood to hold certain materials in solution.
7. To serve special purposes, such, for example, as the influence of sodium chloride on hydrochloric-acid formation, and that of lime salts in favoring coagulation of the blood. (Chambers.)

EXCESS OF SALT.

Salts of any kind, when taken in excess with food, disagree with digestion in various ways. They may prove a local irritant to the gastric or intestinal mucous membrane. They modify the rate of absorption of digestive material, and alter the intensity of reaction of the different digestive fluids.

DEPRIVATION OF SALT.

Continued deprivation of any one of the common salts, so long as others are furnished in reasonable abundance in the food, does not result seriously. If, however, all the salts are reduced in quantity, or if they are entirely excluded from the diet, the system very soon begins to evince signs of malnutrition. Animals or men deprived of salts for a long time suffer greatly from indigestion and from lack of bodily nutrition. The body may not diminish in weight, but the tissues become flabby, the muscles feeble, the mind stupid and dull; the nutrition of the skin is altered; it becomes dry, and the hair falls out. Eventually in animals with salt starvation death occurs in from six to eight weeks from progressive bodily weakness and inanition,—a condition, practically, of marasmus.

Young infants who do not obtain sufficient salts of lime, *i. e.*, if fed upon proprietary infant foods instead of good milk, become rachitic; their bones ossify slowly, and bend into deformities. Such children should be properly fed on milk.

SODIUM CHLORIDE.

Table salt is by far the most important and valuable salt, and is used in the largest amount. Common salt stimulates the appetite and influences beneficially the gastric secretion. It not only furnishes the chlorine for hydrochloric acid, but seems to act locally in the stomach by promoting this secretion, as well as the conversion of pepsinogen into active pepsin. It has been proven that the absence of salt from the diet completely checks the production of hydrochloric acid in the stomach. (Cohn.)

POTASSIUM SALT.

Next in importance to sodium chloride (table salt) is potassium salt, which is the predominant salt of the muscles, and which, like sodium chloride, is a common ingredient of nearly all the tissues and fluids. The acid and neutral carbonates and phosphates of sodium and potassium are chiefly important in regulating the reaction of the digestive secretions and the urine.

CALCIUM.

These are chiefly of value from their constituting a large percentage of the composition of the bones and teeth, as well as a smaller percentage of many other tissues of the body.

PHOSPHORUS.

Phosphorus is derived from phosphates in meat and its contained blood which is eaten, as well as from vegetables. It enters into the composition of the bones, muscles, blood, etc.

SULPHUR.

Sulphur is derived from sulphates contained principally in fibrin, egg albumen, the casein of milk, and from such vegetables as corn, turnips, cauliflower, and asparagus.

IRON.

The iron is found in the blood pigment, where it amounts, all told, to a third of an ounce. It is also present in minute traces in other pigments. Its chief source is from the blood of animals which is cooked with their meat. It is also derived from, and it may be taken with, chalybeate waters.

VEGETABLE ACIDS.

The common organic or vegetable acids—citric, tartaric, malic, etc.—are derived from fresh vegetables and fruits, in which they exist.

ANIMAL FOODS.

Animal foods contain much nutrient matter in a more or less concentrated form, which exists in practically the same chemical combination with the body itself. They leave comparatively little residue, being thoroughly digested.

MILK.

The milk of several animals, such as cows, goats, asses, mares, and camels, may be used for food, but in this country little other than cow's milk is employed. Milk contains the elements which are necessary for the maintenance of life in fairly economical proportion, so that for infants it constitutes a "complete" food, which fully meets the requirements of the growing body, and in adults it will sustain life comfortably for many months.

For these reasons milk ranks among the most important of all foods, and it is necessary to determine to what extent it should be introduced into ordinary diet. A pint of milk may be said to represent approximately the nutrition contained in six ounces of beef or mutton. Although it furnishes so useful a food, milk is by no means essential to a diet designed for increasing bodily strength, and it is usually omitted from the menu of athletes in active training. Adults who are able to eat any kind of food usually maintain their health in better condition by abstaining from milk except as used for cooking purposes, inasmuch as it makes many persons bilious to drink it, and produces constipation, particularly when taken in excess with other foods.

AN EXCLUSIVE MILK DIET.

An exclusive milk diet is usually desirable in the following conditions and diseases:—

1. In infancy for the first year, and sometimes for the first eighteen months.

2. In all acute diseases of young children.
3. In typhoid fever.
4. In acute Bright's disease, and sometimes chronic nephritis.
5. In acute pyelitis.
6. In chronic gastric catarrh.
7. In gastric ulcer and carcinoma.
8. In neurasthenia.

A milk diet is easy to prescribe, so cheap and so easily procured, that it is always the first resort of those who from indifference or lack of knowledge of the first principles of dietetics, are unwilling or unable to take pains to study the peculiarity and needs of the individual case.

An exclusive milk diet in time becomes monotonous and wearisome to most adults, and may produce dyspepsia and constipation, and interfere with the functional activity of the liver. Aside from nausea, which the continued use of milk may excite, a positive loathing for the taste of it is apt to be developed, unless the regimen is modified by occasional variations. This is a matter of considerable importance in feeding patients suffering from typhoid fever, chronic Bright's disease, chronic gastric catarrh, and other affections for which milk diet is often prescribed; for if other substances are substituted from time to time in small amounts, while milk is still retained as the chief food, it may be continued as such for a much longer time. On seeking the cause for the disagreement of milk, it is found in the fact that it contains too large a proportion of nitrogenous material as compared with the hydrocarbons, so that, in order to obtain sufficient of the latter, an excess of proteid is ingested, which interferes with digestion.

MILK CURE.

The milk cure has been carried out successfully by Pecholier, Weir Mitchel, Karell, and others for the treatment of obstinate hysteria, hepatic congestion, dropsy, and various anomalies of nutrition. The patient is given no food but milk, which Pecholier orders every two hours in small amounts, increasing the quantity until three litres a day are taken. Mitchel commences with doses of half an ounce to two ounces every two or three hours, and increases the dosage by half an ounce until six ounces or more are taken. If thirst is complained of, natural water or Seltzer water is given. If the taste of the milk is complained of or is disagreeable, coffee, salt, or caramel is added. After three or four weeks, rice, arrowroot, and thin slices of white bread are allowed, and after five weeks raw meat or one or two cutlets (the loin cutlets are the best). The milk, meanwhile, is continued. After a day or two of this treatment, hunger and thirst are not usually complained of. At first the pulse is accelerated, but there is seldom any conspicuous nervousness. The tongue is coated; the water in the urine is increased; there is obstinate constipation (which must be relieved by enemata or medicines); the stools are hard, and ochre or white in color, and a great deal of epigastric distress and a feeling of emptiness

are present. The arterial tension is lowered; there may be muscular prostration; there is loss of weight at first. If the treatment is persevered in, at the end of a fortnight there is marked improvement in the feeling and condition of the patient, and after six or eight weeks the cure is usually far advanced.

RAW EGGS.

Whole raw eggs are very popular in dietetics at present, and they are often prescribed when a nutritious, highly-concentrated diet is desired, as in the case of consumption and some forms of anæmia, and various wasting diseases. Sometimes from a half dozen to a dozen a day are given, if they can be digested.

They are given in the form of egg-nog, or beaten up with milk, also with coffee; or they may be given in port wine or sweetened water. In fever cases egg-nog can not be taken. The whites of eggs (egg albumen) only should be used where egg-nog does not agree with the patient. A raw egg is ordinarily digested in the stomach in one and a half hours, but an egg baked in a pudding requires from three and a half to four hours to digest.

An excellent way to cook an egg is to have a quart of boiling water; lift the vessel from the stove, drop the egg into the boiling water, set it aside on a table, and let it stand five or six minutes. Then break the egg into a warm tumbler, add a pinch of salt and pepper if desired, also a very little fresh butter may be allowed. In the ordinary rapid cooking of eggs in boiling water the white is firmly set before there is time for the temperature of the interior of the egg to be thoroughly raised, and consequently the yolk is softer than the white.

In cooking omelets and scrambled eggs, the white is thoroughly mixed with the yolk, and the egg is more digestible than when fried or cooked so much that the albumen is hard.

TO PRESERVE EGGS.

Eggs decompose from the admission of germs through their porous shells. They may be coated with varnish, tinfoil, butter, or any fat or oil not liable to become rancid. Packing in sawdust also excludes the air to a slight extent.

MEATS.

A meat diet, if long continued, tends to produce scurvy, and the absence of meat favors the occurrence of anæmia in many persons. In general, those diseases in which an exclusive meat diet, or a diet composed almost exclusively of animal food, with perhaps a minimum of dry bread, is found beneficial, are the following: Flatulent dyspepsia, chronic gastritis and gastric catarrh, and dilatation, diabetes, intestinal dyspepsia, phosphaturia, obesity, and some cases of chronic dysentery. Meat should also enter largely into the diet of consumptives and anæmic subjects.

It is well to reduce or prohibit the consumption of meat in acute and chronic Bright's disease, gout, and rheumatism, lithæmia, and oxaluria.

Raw meat is a prevalent fashion at present, being prescribed in some diseases, such as dysentery or chronic gastritis. It is useful, but it should not be given with the idea that it possesses any special curative value from the fact of being raw. Beef, mutton, and ham are all eaten in this condition. Raw meat has no advantage, either in digestibility or nutrient power, over moderately cooked or "undone" meat. (Thompson.)

TABLE OF COMPARATIVE DIGESTIBILITY OF MEATS. THE MOST DIGESTIBLE IS GIVEN FIRST, ENDING WITH THE LEAST DIGESTIBLE.

Oysters.
Soft-cooked eggs.
Sweetbread.
White fish, boiled or broiled.
Chicken, boiled or broiled.
Lean roast beef or beefsteak.
Eggs, scrambled or omelet.
Mutton, roasted or boiled.
Squab, partridge.
Bacon.
Roast fowl, chicken, capon, turkey.
Tripe, brains, liver.
Roast lamb.
Chops, mutton or lamb.
Corned beef.
Veal.
Ham.
Duck, snipe, venison, rabbit.
Salmon, mackerel, herring.
Roast goose.
Lobsters and crabs.
Pork.
Smoked, dried, or pickled fish, and meats in general.

Bauer places the order of easiest digestibility of meats in delicate stomachs as follows: Young poultry (fowl or pigeons), veal, game, and beef.

BEEF PREPARATIONS FOR THE SICK.

Beef is so important a food for well and sick alike that many attempts have been made to improve its digestibility for the latter.

Much attention has of late been given to the predigestion of meat, and especially of the production of albumoses, which are more soluble and assimilable than undigested meat albumin, and which are said to possess greater nutritive property than peptones. In general, about

three grams of meat extract constitute a good soup ration, and such preparations are often valuable for addition to invalid soups and broths when thickened with egg, rice, sago, pearl barley, macaroni, ground toast, etc.

The preparations of meat for the sick are both solid and fluid.

SOLID MEAT PREPARATIONS.

Scraped meat is best made from tender beefsteak broiled for a few minutes over a brisk fire; but rare roast beef or mutton chops may be used. The pulp is best scraped out with a dull knife or iron spoon. The indigestible and less nutritious connective-tissue sheaths of the muscle fasciculi are broken and left behind, while the fibers themselves are obtained in the form of a soft, unirritating mass, which is readily acted upon by the gastric juice. The pulp may be run through a sieve. It is then salted, and it may be made into little balls and browned just before eating. This is done by placing the balls on a hot frying-pan, which is not greasy, and turning them over so that the outside becomes well seared. They should then be set aside on a cooler part of the stove and allowed to remain a few minutes until the raw-red color of the interior turns slightly to a drab.

Some patients prefer to eat the meat scarcely cooked, spread as a sandwich between thin slices of bread and butter. This meat (without the bread) may be fed to infants in their second year, and the meat balls are invaluable in the treatment of chronic gastritis, dilatation of the stomach, typhoid convalescence, and other affections.

MOSQUERA'S BEEF MEAL.

This is made by digesting fresh, tender, lean beef, with pine-apple juice until the muscle fiber is almost completely converted into peptones. After digestion, the preparation is desiccated.

Chittenden's analysis of this meal shows it to contain ninety per cent of nutriment, thirteen per cent of which is fat and seventy-seven per cent is proteid.

The beef meal is tasteless and odorless, which are decided advantages, as it can be flavored according to preference. It should be salted, and may be added to broths and soups. D. D. Steward advises its use with equal parts of sugar and cocoa. This mixture is added to hot milk.

DARBY'S FLUID MEAT.

This is a moist extract which has a strong meaty taste. It can be eaten spread on thin bread and butter or cracker, or it may be dissolved in hot water.

Powdered beef, beef-blood dried, meat lozenges, beef peptonoids, beef extracts, beef tea, and beef juice are all useful preparations, and the family physician prescribes such preparations as are suited to each individual case.

FISH.

Fish vary both in digestibility and nutritive qualities. The chief differences are in regard to coarseness of fiber and the quantity of fat present. Fish meat is less stimulating, sustaining, and satisfying than that of birds or mammals. The following fish, in the order named by Walker, have the largest percentage of albuminoids: Red snapper, white fish, brook trout, salmon, blue fish, shad, eels, mackerel, halibut, haddock, lake trout, striped bass, cod, flounder.

All fish are best in their proper season, for out of season they deteriorate from change in food or other causes, and are less nutritious, besides possessing inferior flavor, and sometimes disagreeable odor.

They should be eaten as fresh as possible, for there are few alimentary substances capable of exciting so violent gastro-intestinal disturbance as decomposing fish.

There are no diseases in which a fish diet is said to possess specific value, but often in chronic Bright's disease, lithæmia, gout, or other conditions in which it is undesirable to give much meat, it is very serviceable as a change.

SHELL-FISH.

Oysters, clams, and mussels are nutritious food, and the former are more often prescribed. Eaten raw or properly cooked, they are excellent invalid aliment. Oysters can often be digested earlier than meat in convalescence from fevers, etc.

SUGARS.

Sugars are crystallizable carbohydrates, in which oxygen and hydrogen exist in proportion to form water. There are many varieties, of which the commoner contained in food or used as an adjunct to diet are cane sugar, saccharose, grape-sugar or glucose, and sugar of milk or lactose. Inosite, mannite, dextrine, sugar of malt or maltose, honey, a sweet nitrogenous substance called charin, and fruit sugar or levulose, are also used. Sugar may be derived from stems of plants, as in case of sugar-cane, or the palm, from tubers like beet, from maple-tree sap, and from other vegetable growths.

As foods, sugars have essentially the same uses as starches, for all starches must be converted into dextrine or sugar before they can be assimilated. For this very reason, sugars, although they form an excellent class of foods, producing force and heat and fattening the body, are not absolutely necessary for the maintenance of health if starches or fats are eaten. Many persons acquire an inordinate fondness for sugar, and overindulgence in this food is very sure to give rise to flatulent dyspepsia, constipation, and disorders of assimilation and nutrition. It may cause functional glycosuria. Sugar is very fattening. Sugars are emphatically force producers. Chauveau and Kaufmann have demonstrated that during muscular activity the consumption of sugar in the body is increased fourfold.

CEREALS AND OTHER STARCHY FOODS; STARCHY FOODS IN GENERAL.

The cereals in commonest use as food products are wheat, corn, rice, rye, barley, oats, buckwheat. From these are manufactured a variety of flours and meals. Besides the cereals are vegetables, which, like the potato, are composed chiefly of starch. There is a large miscellaneous group of starchy foods used as flours, which are therefore conveniently considered with cereals. Such are arrowroot, tapioca, cassava, sago, and peas. Peanuts, chestnuts, and plantains are also sometimes used to furnish flour.

Farinaceous foods are composed of flour of different kinds, and constitute a subdivision of starchy foods. The different starchy and farinaceous foods are derived from a variety of plant structures, including roots, tubers, bulbs, stems, pith, flowers, seeds, fleshy fruits, etc. Some, like the banana and certain vegetables, are eaten raw, but the majority require cooking, and the starches derived from grain-bearing plants of the grass tribe or cerelia usually must be prepared by grinding and milling before cooking.

COMPOSITION OF BREAD.

Bread is really a mixed food, in that it contains so many classes of ingredients,—fat, proteid, salts, sugar, and starch; and this is probably the explanation of the fact that its daily use never cloys the appetite. Although it contains some fat, it has not enough for a perfect food, and hence the almost universal custom of using butter with it. Moreover, it forms a convenient vehicle for taking fat in this manner, and the butter aids in the mastication and deglutition of the bread.

VARIETIES OF BREADSTUFFS.

Bread of different kinds constitutes the staple starchy food for Americans, as the potato does for the Irish peasantry, and macaroni does for the Italians.

The most important bread used, both from the standpoint of its nutritive value and the quantity consumed, is derived solely from wheat flour; but, for economical or other reasons, this flour is sometimes advantageously mixed with potatoes or bean flour. The latter, added in the proportion of one part to ten of wheat, is said to give a white bread rich in nitrogen and highly nutritious. Corn flour may be mixed in the same proportion.

Whole-meal Bread.—For some flours the whole of the wheat is used, the gluten, nitrates, and phosphates being all retained. They are more delicate than oatmeal, and more digestible. Wheat yields soluble matter, such as albumin and dextrine, amounting together to about ten per cent, besides various salts. The insoluble matter of the grain is chiefly starch and gluten, which constitute from seventy to seventy-five per cent. Wheaten bread contains about twenty-five per cent of carbon and one to two per cent of nitrogen (or about eight per cent of proteid material).

Pumpernickel.—This is a German black bread, made of unbolted meal and sour dough. It is somewhat laxative.

Zwieback.—This is a thoroughly dry form of bread, which is very wholesome for invalids. It contains about sixteen per cent of solids.

Graham Bread.—This bread is so called after Sylvester Graham, who advocated its use. It differs from white wheat bread by containing the outer coatings of the wheat kernel, called bran, which contains a larger per cent of albuminous material and phosphates. The bran, however, while containing serviceable food products, is so difficult of digestion that it tends to irritate the mucous membrane of the intestines, and increase peristaltic action. For this reason it is more laxative than white wheat bread, but also less nutritious.

Gluten Bread.—Bread made from gluten flour is useful where there is a tendency to obesity, and is given to diabetics. It may be toasted like ordinary bread.

Rye Bread.—Next to wheat, rye is the most important bread-making flour, although it is less digestible for invalids, and it may be mixed with wheat flour in the proportion of two parts of the former to one of the latter.

PREPARED FARINACEOUS FOODS.

(*Often called infant food.*)

Prepared farinaceous foods are made, first, by the application of heat alone; second, by digestion with malt or diastase combined with heat; third, after dextrinization, the food is evaporated with milk or cream.

The prepared farinaceous foods may be eaten alone or diluted with water, but they are usually given to invalids in a cup of broth or beef tea, which disguises their sweetness. The sweeter varieties are best combined with milk.

Imperial granum is a type of a large class of prepared foods, the basis of which is starch, which has been modified, it is claimed, so as to render it easily digestible. Such foods are often fed to very young infants, which has proven to be the greatest mistake that can be made; for their digestive apparatus is wholly unfit to deal with starch in any form. The human infant is designed to be nursed at the breast for the first year of life, and nature has furnished ample food for it which is wholly devoid of starch. The saliva and pancreatic secretions, upon which the digestion of starches depends, are not fitted for this work at all during the first eight or nine months of life, and then only partially; hence starchy foods—"farinaceous baby foods"—should never be given at all before that age as foods, and should only be used very sparingly, if at all, as mechanical diluents of milk. (Starr.)

Granum is composed of over three-fourths starch, made into a fine flour. One teaspoonful of it should go to each three ounces of water, in which it is boiled for ten minutes. An equal quantity of milk is then to be added, and the mixture must again be boiled for five minutes.

The mixture may sometimes be fed to an infant after the eighth month of age, but only once or twice in twenty-four hours.

Flour Ball.—This is prepared by boiling wheat flour tied in a bag, for the purpose of converting it into dextrine, and it is a popular belief that this conversion is almost if not quite complete. But Leeds has shown by recent analysis that even after seventy-five hours of continuous boiling the percentage of soluble carbohydrates is increased by only .05 of one per cent; whereas some of the prepared foods contain from two to six times as much soluble carbohydrates as wheat flour.

Mellin's Food.—This food consists of sweetish granules, easily soluble in both hot and cold water, milk, etc. It is made of coarsely-ground wheaten flour, with the addition of malt and potash. It is then digested with water at a moderate temperature to form dextrine and sugar. Afterwards it is strained through sieves, and evaporated in a vacuum pan.

Mellin's Food is often fed to infants, but it contains too much sugar without fat for a wholesome baby's food for continued use in quantity. About one teaspoonful is dissolved in two ounces of water and half a pint of milk. It may be resorted to temporarily when good cow's milk can not be obtained.

Malted Milk.—This is a powdered sterilized preparation of pure cow's milk and extract of barley and wheat, the starch of which has been converted into dextrine. The mixture is dried *in vacuo*. The directions for its use are given on the labels on each bottle or jar.

Bread Jelly.—A bread jelly may be made, to add to milk for invalids, and for use while weaning infants who are old enough to digest a little starch, *i. e.*, over one year of age. Crumbs of stale bread are broken into small fragments, covered with boiling water, and allowed to soak until well macerated. The water is strained off, fresh water is added, and the mass is boiled until quite soft. On cooling, a jelly forms which may be mixed with milk in any desired proportion.

Farena.—This is a general name meaning flour, and is defined by Webster as "the flour of any species of corn or starchy root." Much of the gluten and bran has been separated, rendering it less nutritious than whole wheat. In case of diarrhea it is more bland and less irritating than whole wheat. The name farina is also applied to fine, white potato starch, which forms a jelly when cooked, like arrowroot.

Wheatena.—This is a nutritious food, containing all the wheat berry excepting the husk, and thereby differing from finer preparations in which the layer gluten cells are removed with the bran. It is commonly eaten as a thin mush or porridge.

Crackers.—All kinds of crackers enter more into the dietary in America and England than in any other country. The lighter forms of sugar wafers are nutritious and very easily digested by invalids having mild gastric disorders, for the starch has been well torrefied.

Corn, maize, or Indian corn, is very extensively grown in tem-

perate and warm climates all over the world. It may be dried, parched, roasted whole, or ground into meal of various degrees of fineness.

Corn is a wholesome cereal, for it contains considerable fat and proteid as well as starch, and it furnishes abundant energy, producing heat. It is very fattening for both the lower animals and man.

Corn-meal.—Corn-meal is quite digestible, and, like oatmeal, is somewhat laxative. As compared with wheaten flour, it contains more fat, having about nine per cent; but it is deficient in salts. It makes a dry, friable bread.

Rice.—Although less eaten in this country than wheat, corn, and rye, except in the southern states, rice constitutes the staple food of a majority of the world's inhabitants. Asia produces most of the rice consumed. Both the Chinese and Japanese make a wine from rice, and a vinegar can also be obtained.

Rice contains more starch than any other cereal,—from seventy-five to eighty-five per cent,—and is an exceedingly digestible form of starch for invalids when properly cooked, so that the individual grains are swollen or softened. This process is best attained by steaming. The digestibility of plain boiled rice is improved by eating it with a little fresh butter. Rice pudding, milk and rice, and rice with beef-steak juice constitute excellent foods for young growing children, and for use in convalescence from typhoid fever, diarrheas, and many other diseases. It is also advantageous to eat rice with prunes or apples.

Barley.—Barley ranks very close to wheat in nutritive qualities, and cooked barley-meal, like wheaten flour, contains gum, albuminoids, starch, and dextrine. As compared with wheat, barley contains more fat, salts, and indigestible cellulose, less proteid, and less digestible carbohydrates.

Barley-water makes an excellent diluent and demulcent drink for infants and invalids. For invalids it may be flavored with lemon-juice. It may be made as follows: Grind half an ounce of pearl barley in a coffee mill, add six ounces of water, boil twenty minutes, add salt, and strain. It should be made fresh daily, and kept in a cool place.

Oatmeal.—Oats contain considerable fat, proteid, salts, and indigestible cellulose, in addition to a large percentage of starch. For those who can digest oatmeal well, it ranks among the cheapest and most satisfying of foods.

The nutritive value of oatmeal is great, but it depends very largely upon the skill with which it is cooked. For most persons, and especially for all those with limited digestive power, oatmeal should be so thoroughly cooked as to acquire the consistence which enables it to be easily poured, and on cooling it should form a tender gelatinous mass. Oatmeal is a very hearty food, and those who eat much of it should live a vigorous outdoor life. If ill-cooked, and given to very young children, it occasions colic, flatulence, and rash.

Arrowroot.—Arrowroot is derived from the rhizomata or root-stocks of several kinds of tropical plants grown in both the East and

the West Indies. The roots are washed, reduced to a pulp, strained, dried, and pulverized into a very fine, starchy flour. It has a very bland, insipid taste, and when cooked it is as digestible as any starch used in making gruel or jellies for invalids, if not even more so. In bad cases of dyspepsia, when much gastric irritation exists, it often constitutes a serviceable article of diet. Arrowroot is sometimes fed to young infants, but it is unwholesome for them, and sours on the stomach.

Tapioca, Cassava.—Tapioca and cassava are made from the rhizomata of the *Manioc utilissima* (spelled also manihot), a common plant in temperate and tropical regions. Tapioca, which is purified cassava, is made, like sago, by drying on hot plates. It is an almost pure starch. Tapioca may be eaten alone in the form of puddings, with cream, or flavored with lemon juice, mace, wine, or other spices. Pearl tapioca is a spurious article made from potato starch.

Sago.—Sago is an easily-digestible form of starch derived from the pith found in the stem of different varieties of palm in Sumatra, Java, and Borneo. It is commonly sold in market in a granular form, and is known as pearl sago. Sago is made, with milk, cream, and eggs, into nutritious puddings, and it may be used to thicken broths and soups of various kinds.

STARCHY FOODS FOR CHILDREN.

The best cereals and other starches for children are rice, hominy, Indian meal, barley, oatmeal, cracked wheat or wheaten grits, farina, corn-starch, and sago. When the cereal grains are used instead of flour, they should be soaked in cold water for five or six hours, and then cooked for two or three hours in a double boiler. If fed to infants less than two years of age or to children with any gastro-intestinal disorder, they must be thoroughly strained. They should be salted and served with cream, but without sugar. Bread and crackers may be allowed to infants after the first eighteen months, but only with their meals.

VEGETABLE FOODS.

Nearly all great divisions of the vegetable kingdom afford wholesome food for man.

Vegetable food eaten in large quantity increases the elimination of carbon dioxide from the lungs. It also makes the urine alkaline, and intensifies the alkalinity of other secretions.

The chief vegetable proteids are vegetable albumin, vegetable casein or legumin, and gluten. These proteids are less rich in nitrogen than corresponding animal albumen.

A purely vegetable diet is not economical for a laboring man, for the reason that to derive sufficient nitrogenous substance from it he must either obtain the very best and most expensive cereals or legumes, or he must eat a very large quantity of vegetables. By the addition of albuminous food or fat to his diet, he saves both expense and wear

and tear of his digestive organs. If unable to obtain fresh meat, he may employ for this purpose milk, bacon, lard, and dried fish, such as herring or cod. Among vegetable foods, oatmeal and beans will furnish him with the largest available proportion of nitrogenous material. Vegetables, except those which are really seeds, such as those of the leguminosæ, or pulse tribe, contain but little fat. (Thompson.)

The following-named vegetables are those in common use which contain the largest percentage of both starches and sugar: Potatoes (both sweet and white), yams, beans, lentils, corn, peas, carrots, parsnips, beets, turnips.

Vegetable foods which are somewhat stimulant or pungent in their action are leeks, onions, garlic, herbs in general, mustard, mints, asparagus, and radishes. They increase the secretion of the saliva and gastric juice, and several are somewhat diuretic.

Some vegetables are laxative on account of their special chemical composition. Such, for example, are spinach, tomatoes, and vegetables when fresh and well cooked.

All vegetables which are eaten raw should be washed beforehand; otherwise they may be contaminated with manure and other impurities, or the excrements of domestic animals which have been roaming in the garden. The larvæ of both tapeworms and round worms have been transmitted to man in this manner. Water from foul wells is sometimes used for sprinkling gardens, and it is possible for typhoid, cholera, or other noxious germs to be spread by this means when the vegetables are eaten raw. (Wood.)

FRUITS.

Speaking generally, fruits are composed largely of water, with sugars, a vegetable jelly called pectin, cellulose, and organic acids.

The organic acids exist mainly in onions with alkalies, forming compounds which are readily split up in the system, leaving the alkalies to combine as carbonates or phosphates. (Bauer.)

The most important acids are citric, malic, and tartaric, which exist in various quantities and combinations. Citric acid predominates in lemons, limes, and oranges; tartaric acid, in grapes; malic acid, in apples, peaches, apricots, gooseberries, and currants. Among the least acid of common fruits are peaches, sweet pears, sweet apples, bananas, and prunes; strawberries are moderately acid.

Uses and Properties of Fruits.—The uses of different fruits are summed up as follows:—

First, to furnish nutriment.

Second, to convey water to the system and relieve thirst.

Third, to introduce various salts and organic acids which improve the quality of the blood and react favorably upon the secretions.

Fourth, as antiscorbutics.

Fifth, as diuretics, and to lessen the acidity of the urine.

Sixth, as laxatives and cathartics.

Seventh, to stimulate the appetite, improve digestion, and give variety in the diet.

Eighth, as special cures for certain diseases, like the grape-cure, although it is said their specific action is very doubtful.

The fruits which afford the most nutriment are the banana, date, fig, prune, and grape. This is due to the large proportion of sugar which they contain.

The fruits which contain the most water are watermelons, muskmelons, oranges, grape-fruit, lemons, shaddocks, and grapes. The antiscorbutic value of fruits is illustrated particularly by certain varieties which furnish abundant potash salts, as well as lime and magnesia. Among these are to be mentioned apples, lemons, limes, and oranges.

The diuretic influence of fruits is in part due to their water, but chiefly to their organic acids and salts, which stimulate the circulation and probably, also, the activity of the renal epithelium.

The best fruits to offset constipation are fresh apples, figs, prunes, peaches, and berries. Dyspeptics must be careful to avoid eating all kinds of hard skins, seeds, or coarse-fibered fruits.

Fruit Ripening.—As fruit ripens, it absorbs more and more oxygen, and the tannin and vegetable acids which it originally contained are altered, so that it becomes less astringent and more acid. The starch is more or less turned into levulose or glucose, and soluble pectin is formed. The aroma and taste of ripe fruits depend upon the relative quantity of these different substances, together with various volatile ether and oils. The sour fruits have either more acid or less sugar, and in the sweet fruits there is a preponderance of sugar which masks the acid taste. The employment of fruits as a common article of daily diet is highly beneficial.

Fruit Poisoning.—While fruits eaten daily and in proper moderation are very wholesome, if they are eaten too freely, or if they are either insufficiently ripe or overripe, soft, and decomposing, they undergo malfermentation in the alimentary canal, and are almost certain to cause diarrhea, with colicky pains, cramps, and sometimes nausea and vomiting. Severe attacks of gastritis may, especially in children, be produced by indulgence in unripe apples, pears, cherries, berries, etc., and even fatal choleraic diarrhea has been occasioned by the indiscriminate consumption of fruits which have strongly laxative action. After such fruit-poisoning, emesis should be excited if the patient is seen in time, and otherwise, if free purgation has not occurred, it is advisable to give a dose of castor-oil or other cathartics, to remove the irritating substances as soon as possible from the alimentary canal. In bad cases, prolonged gastric fever may ensue.

When to Eat Fruit.—Cooked fruits may be eaten with any meal; but when fruit is eaten for special dietetic purposes, its effect is always more pronounced if it is taken alone, either at the commencement of meals or, better, between them. One often observes patients who can obtain no laxative effect from apples, figs, and other fruits eaten as

dessert; but when they are taken at night into an empty stomach, or an hour before breakfast with a glass or two of cold water, a very pronounced favorable influence has been exerted upon the bowels.

The poorest time for eating fruit is at the conclusion of a very hearty dinner, at which a considerable variety of food has already been consumed. Fruit is generally less wholesome when eaten out of its natural season. All fruits, such as berries, the seeds of which are eaten, are much less liable to produce intestinal irritation if taken with bread or other bulky starchy food.

Fruit Soups.—In Germany fruit soups are more in vogue for general use than in this country, and they are often prescribed for fevers when diarrhea does not exist. Uffelmann directs that for making a fruit soup, one part of fruit to four or five of water may be used, and Bauer recommends soups "made of boiling fresh or dried fruits with water, with or without the addition of sugar, lemon peel, etc., and freed from the solid residue by pressure."

Digestibility of Fruits.—Among the commoner fruits of easy digestion are grapes, oranges, lemons, cooked apples, figs, peaches, strawberries, and raspberries. Somewhat less digestible are melons, prunes, raw apples, pears, apricots, bananas, and fresh currants. Of course the digestibility depends very much upon the ripeness and freshness of the fruits as well as personal idiosyncrasy, and any classification can be only approximately correct.

The most useful fruits for the sick are lemons, oranges, baked apples, stewed prunes, grapes, and banana meal (not the fruit pulp).

Henry claims that pure lemon juice poured into the nose will often control epistaxis, or nose-bleed.

NUTS.

Nuts contain proteids with some starch and more or less fat. With the exception of the cocoanut, chestnut, almond, and English walnut, the varieties eaten in this country furnish but little nutriment. Their chief value is to stimulate the appetite and afford a variety in the diet. As a rule, they are not prescribed in invalid dietaries, but, with the exception of chestnuts and peanuts, they are allowed to diabetics, and there are some few patients with dyspepsia whose sluggish stomachs are stimulated into greater activity by eating a few parched or salted almonds or walnuts after a meal.

FATS AND OILS.

Fats and oils contain but three elements—namely, carbon, oxygen, and hydrogen. In some fats like butter, but very little oxygen is present, and carbon and hydrogen compose the bulk of the substance. The amount of fat which from time to time is stored in the body is regulated to a greater degree than any other substance by muscular exercise, which, in active persons, always tends to prevent its accumulation. The storage of fat is favored by sleep as well as inactivity.

About one-fifth of the entire body weight is composed of fat, but only about a quarter of an ounce is contained in the blood.

Fat is required to promote the earlier stages of growth and development of the organism, and there are also many forms of disease and degenerative changes which are accompanied by the increased accumulation or production of fat in and between the tissues and cells. It is impossible to live in perfect health without fatty food, and it is equally impossible to live long upon fat alone; for it soon disorders the digestion and causes absolute disgust.

Uses of Fats.—The chief uses of fatty foods are: To furnish energy for the development of heat; to supply force; to serve as covering and protection in the body; to lubricate and make more plastic various structures of the body, and give rotundity to the form; to spare the tissues from disintegration; for, although their combustion in the body results largely in the production of heat, they also take part to some extent in tissue formation; also to serve for storage of energy.

Digestibility of Fats.—Most of the fat used as food melts at the temperature of the body, which facilitates its digestion.

Children often eat butter more readily than any other form of fat. As a rule, the stomach is less disturbed by animal than by vegetable fats taken in excess, and the former may be tolerated for a longer time. Overdoses of fat at any time are apt to give rise to the formation of irritating acids which cause nausea and vomiting, with possibly abdominal cramps and loose evacuations. Fat taken too liberally with other food ceases to be economical for the system, and becomes positively harmful.

Since fat is exclusively digested in the small intestines, diseases of any part of the alimentary canal are contraindications for its use. The digestibility of all fats depends somewhat upon the cooked state. Many persons are nauseated or made dyspeptic by eating hot mutton fat who can eat the same with impunity when it is cold. In the latter condition it becomes more friable and, if thoroughly mixed in chewing with starchy food, or used as suet in the form of farinaceous pudding, it becomes very much more digestible. Animal fats have a higher nutritive power than those derived from vegetables, and liver fat, butter, and cream are the most serviceable of all.

STIMULANTS AND BEVERAGES.

The uses of stimulants and beverages that are classed under these headings are found to serve in one or more of the following ways:—

1. To relieve thirst and introduce fluid into the circulation.
2. As diuretics.
3. As diaphoretics.
4. As diluents of the food and of the waste material in the body.
5. As stimulants of the nerves and other organs.
6. As intoxicants.
7. As demulcents.

8. As tonics, and to promote digestion.
9. As astringents.
10. For nutrition.

The effects of all beverages and stimulants are far more pronounced if they are taken into an empty stomach, which insures their prompt absorption.

1. To relieve thirst, all fluids which are not too sweet may be used, but sour beverages, such as acid lemonade or raspberry vinegar, the effervescing carbonated waters, solution of potassium bitartrate, or dilute mineral acids in water, are generally the most acceptable.

2. As diuretics, the mineral waters and carbonated waters hold the first rank. With many persons coffee is also an active diuretic. So are beer, gin, champagne, and, to a lesser degree, other forms of alcohol, and tea.

3. As diaphoretics, hot spirits and water or hot tea may be used.

4. As diluents of the ingested food and waste material of the body, the alkaline and carbonated effervescing or bland waters are the best.

5. As stimulants of the nerves and other organs, the milder forms of alcoholic beverages, diluted spirits, tea, and coffee are used.

6. As intoxicants, beers, ales, strong wines, champagne, and strong liquors are the most powerful agents.

7. As demulcents, mucilaginous, farinaceous, and gelatinous beverages are used for fevers, etc., such as barley or oatmeal water, arrowroot and other light gruels, solutions of gelatin, flaxseed tea, etc. When taken hot they are soothing for coughs, and promote expectoration.

8. For use as tonics and to aid digestion, may be mentioned malt extracts, ales, light wines, clarets, Burgundies, diluted brandy or whisky, chalybeate and arsenical waters, and alkaline waters drunk before meals.

9. As astringents, red wines and tea are of chief importance.

10. For nutrition, cocoa, chocolate, malt extract, and, because of the milk or cream added, tea and coffee.

Of all these beverages, lemonade and orangeade are perhaps the most useful in the sick-room. These are agreeable, cooling, and refreshing in fevers, mildly diuretic, and beneficial in many ways.

CHAPTER LXVII.

SICK-ROOM DIETARY.

COOKING.

Toast-water.—Toast three slices of stale bread to a dark brown, but do not burn. Put into a pitcher; pour over them a quart of boiling water; cover closely, and let stand on ice until cold; strain. Wine and sugar may be added.

Rice-water.—Wash a tablespoonful of rice; put into granite saucepan with one quart of boiling water; simmer two hours, when the rice should be softened and partially dissolved; strain; add a salt-spoon of salt; serve warm or cold. May add sherry or port, two tablespoonfuls.

Gum-arabic Water.—Dissolve one ounce of gum arabic in a pint of boiling water; add two tablespoonfuls of sugar, a wine glass of sherry, and the juice of a large lemon; cool, add ice.

Barley-water.—Wash two ounces (a wine-glassful) of pearl barley in cold water. Boil five minutes in fresh water; throw this water away. Pour on two quarts of boiling water; boil down to a quart. Flavor with thinly-cut lemon-rind; add sugar to taste; do not strain unless at the patient's request.

Egg-water.—Stir whites of two eggs into half a pint of ice-water or very cold well water without beating; add enough salt or sugar to make it palatable.

Flaxseed Tea.—Flaxseed, whole, one ounce; white sugar, one ounce (heaping tablespoonful); liquorice-root, half ounce (two small sticks); lemon-juice, four tablespoons. Pour on these materials two pints of boiling water; let stand in hot place four hours; strain off the liquor.

For Sterilized Milk.—(See Infant Feeding.)

Peptonized Milk.—Cold process. In a clean quart bottle put one peptonizing powder (Fairchild's), or the contents of one peptonizing tube; add one teacup cold water; shake the mixture again. Place on ice. Use when required without subjecting to heat.

Milk and Egg.—Beat one tumbler of milk with salt to taste; beat white of one egg till stiff; add egg to the milk, stir. May add a little mace, if desired.

Peptonized Milk Toast.—Over two slices of toast pour one gill of peptonized milk (cold process); let it stand on the hob for thirty minutes. Serve warm or strain and serve the fluid portion alone. Plain light sponge cake may be similarly digested.

Koumiss.—Take an ordinary beer bottle with shifting cork; put in it one pint of milk, one-sixth of a cake of Flieschmann yeast, or one

tablespoon of fresh lager-beer yeast (brewers'), one-half tablespoon white sugar reduced to syrup; shake well and allow to stand in refrigerator two or three days, when it may be used. It will keep in refrigerator indefinitely if laid on its side. Much waste can be saved by preparing the bottles with ordinary corks wired in position and drawing off the koumiss with a champagne tap.

Wine Whey.—Put two pints of new milk in a saucepan, and stir over a clear fire until nearly boiling; then add a gill (two wineglassfuls) of sherry, and simmer a quarter of an hour, skimming off the curd as it rises. Add a tablespoonful or more sherry, and skim again for a few minutes; strain through coarse muslin. May use two tablespoonfuls of lemon juice instead of wine.

Junket.—Take half a pint of fresh milk, heated lukewarm; add one teaspoon essence of pepsin, and stir just enough to mix. Pour into custard-cups, let stand till firmly curded; serve plain or with sugar and grated nutmeg. May add sherry.

Egg Lemonade.—Beat one egg with a tablespoonful of sugar until very light; stir in three tablespoonfuls of cold water; add juice of small lemon; fill the glass with pounded ice and drink through a straw or glass tube.

Egg-nog.—Beat the white of one egg and yolk separately; add to the yolk, while beating, one heaping teaspoonful of sugar; add slowly one tablespoonful of whisky (old whisky), beating the yolk constantly; add the white slowly, beat thoroughly; lastly add two tablespoonfuls of cream (not too thick).

Egg-nog Plain.—Scald some new milk by putting it (contained in jug or bottle) into a saucepan of boiling water, *but do not allow it to boil.* When cold, beat up a fresh egg with an egg-beater or a fork in a tumbler with a teaspoonful of sugar; beat to a froth, add a dessertspoonful of brandy, and fill up the tumbler with scalded milk.

Rum Punch.—White sugar, two teaspoonfuls; one egg, stirred and beaten up; warm milk, large wineglassful; Jamaica rum, two to four teaspoonfuls; nutmeg to taste.

Champagne Whey.—Boil half pint of milk; strain through cheesecloth; add wineglassful of champagne.

Peptonized Oysters.—Mince six large or twelve small oysters; add to them, in their own liquor, five grains of extract of pancreas with fifteen grams of bicarbonate of soda (or one Fairchild's peptonizing tube). The mixture is then brought to blood heat, and maintained, with occasional stirring, at that heat or temperature for thirty minutes. Then add one pint of milk and keep up the temperature ten to twenty minutes. Finally the mass is brought to a boiling point, strained, and served. Gelatine may be added, and the mixture served cold as a jelly. Cooked tomato, onion, celery, or other flavorings may be added at the beginning of the artificial digestion.

Beef Tea.—Free a pound of lean beef from fat, tendon, cartilage, bone, and vessels; chop up fine, put into a pint of cold water to digest

two hours. Simmer on a range or stove three hours, *but do not boil.* Make up for the water lost by adding cold water, so that a pint of beef tea represents one pound of beef. Press the beef carefully, and strain.

Beef Tea.—Chop fine one pound of rump steak freed from fat and bone; put this in a fruit jar and close tight; put the jar in a vessel of cold water, and let it boil from four to six hours; strain, add salt and pepper to taste. Set the jar on a folded towel while it is boiling to prevent breaking.

Beef Tea with Acid.—One and a half pounds of beef (round) cut in small pieces; same quantity of ice, broken small. Let it stand in a deep vessel twelve hours. Strain thoroughly and forcibly through a coarse towel. Boil quickly ten minutes in a porcelain or granite vessel. Let cool. Add half a teaspoonful of acid phosphate to the pint.

Mutton Broth.—Lean loin mutton, one and one-half pounds, including bone; water three pints. Boil gently till tender, add a pinch of salt, and onion to taste. Pour out broth into a basin; when cold skim off the fat. Warm up as wanted.

Chicken Broth.—Skin, and chop up small, a small chicken or half of a large fowl; boil it, bones and all, with or without a little mace, parsley, a tablespoonful of rice, and a crust of bread, in a quart of water, for an hour, skimming it from time to time. Strain through a coarse colander.

Clam Broth.—Wash thoroughly six large clams in shell; put in a kettle with one cup of water; bring to a boil and keep there one minute. The shells open, the water takes up the proper quantity of juice, and the broth is ready to pour off and serve hot.

Cream Soup.—Take a quart of good stock (mutton or veal), cut one medium-sized onion into quarters, slice three potatoes very thin, and put them into the stock with a small piece of mace; boil gently for an hour; then strain out the onion and mace. The potatoes should by this time have dissolved in the stock. Add one pint of milk, mixed with a very little corn flour to make it about as thick as cream. A little butter improves it. This soup may be made with milk instead of stock, if a little cream is used.

Apple Soup.—Two cups of chopped apple; two cups of water; two teaspoons of corn-starch; one and one-half tablespoons of sugar; one salt-spoon of cinnamon, and a bit of salt, or it may be flavored with lemon juice. Stew the apple in the water until it is very soft; then mix together into a smooth paste the corn-starch, sugar, salt, and cinnamon, with a little cold water; pour this into the apple and boil for five minutes; strain it and keep hot until ready to serve. May serve with buttered toast or crackers.

Raw-meat Diet.—Scrape pulp from a good steak; season to taste with salt and pepper; smear on thin slices of bread.

Meat Cure.—Procure a slice of steak from top of round; fresh meat without fat; cut the meat into strips, removing all fat, gristle,

etc., with a knife. Put the meat through a mincer at least twice. The pulp must then be well beaten up in a roomy saucepan with cold water or skimmed beef tea to the consistency of cream. The right proportion is one teaspoonful of liquid to eight of pulp; add black pepper and salt to taste; stir the mince briskly with a wooden spoon the whole time it is cooking over a slow fire or on the cool part of the covered range, till hot through and the red color disappears. This requires about one-half hour. When done, it should be a soft, smooth, stiff puree of the consistency of a thick paste. Serve hot. Add for first few meals the softly-poached white of an egg.

Beef Juice (Bartholow).—Broil quickly some pieces of round or sirloin of a size to fit in the cavity of a lemon squeezer, previously heated by dipping in hot water. The juice, as it flows away, should be received into a hot wine-glass, and, after being seasoned to taste with a little salt and cayenne pepper, taken while hot.

Beef Essence (Yeo.).—Cut the lean of beef into small pieces, and place them in a wide-mouthed bottle securely corked, and then allow it to stand for several hours in a vessel of boiling water. This may be given to infants who can not take milk, in teaspoonful doses, and in larger quantities to adults.

Chrystie's Beef Tea.—Macerate for one hour one pound of finely-minced lean beef in a pint of water containing fifteen grains of sodium chloride (table salt), and five drops of dilute hydrochloric acid, at 100° Fahrenheit. Filter through cheese-cloth, and wash the residue with half a pint of fresh water. A child of two or three years may take two or three ounces daily.

Anderson's Beef Tea with Oatmeal.—This forms a very nutritious food. Take two tablespoonfuls of oatmeal and two of cold water and mix them thoroughly; then add a pint of good beef tea which has just been brought to the boiling point. Boil together for five minutes, stirring it well all the time, and strain through a hair sieve.

Ringer's Raw Meat Diet.—From two ounces of rump steak take away all fat, cut into small squares without entirely separating the meat, place in a mortar, and pound for five or ten minutes; then add three or four tablespoonfuls of water and pound again for a few minutes, afterward removing all sinew or fiber; add salt to taste. Before using, place the cup or jar containing the pounded meat in hot water until just warm.

Or scrape the beefsteak with a sharp knife, and after removing all fat and tendon, if not already in a complete pulp, pound in a mortar. Flavor with salt and pepper. This may be made into a sandwich between thin-sliced buttered bread or mixed with water to the consistency of cream. If preferred, the meat may be rolled into balls with a little white of egg and broiled for two minutes, or until the outside turns gray—just long enough to remove the raw taste.

This diet is excellent for children with diarrhea, also for adults who suffer from irritable bowels or chronic diarrhea.

Meat Biscuits (Parker).—Mix together, cook, and bake one pound of flour, one pound of meat, one quarter of a pound of suet, one-half pound potatoes, with a little sugar, onion, salt, pepper, and spices. Chop the meat very fine, add the flour, then the suet and mashed potatoes, the seasoning, and water enough to make the dough as soft as it can be made to cut in small biscuits; cook (not too quickly).

Nourishing Soup (Ringer).—Stew two ounces of the best well-washed sago in a pint of water till it is quite tender and very thick; then mix it with half a pint of good boiled cream and the yolks of two fresh eggs. Blend the whole carefully with one quart of essence of beef. The beef essence must be heated separately, and mixed while both mixtures are hot. A little of this may be warmed at a time.

Chicken Jelly (Adams).—Clean a fowl that is about a year old, remove skin and fat; chop fine, bones and flesh; place in a pan with two quarts of water; heat slowly; skim thoroughly; simmer five to six hours; add salt, mace, or parsley to taste; strain. Cool. When cold, skim off the fat.

The jelly is usually relished cold, but may be heated. Give often in small quantities.

Home-made Koumiss.—Boil fresh milk, and when nearly cold put into quart bottles, leaving room to shake. Add half an ounce of crushed lump sugar, and a piece of Vienna yeast the size of a hazel-nut (*i. e.,* twenty grains); cork with new corks, tie down; keep cool; lay the bottles horizontally, but shake twice daily. It is ready to drink on the sixth day, or earlier in hot, later in cold weather.

Home-made Lime-water.—Pour two quarts of hot water over fresh, unslaked lime (size of a walnut); stir till slaked; let stand till clear, and bottle. Often ordered (by the physician) with milk to neutralize acidity of the stomach.

Egg and Wine (Ringer).—Take one egg, half a glass of cold water, one glass of sherry, a little, a very little, nutmeg gra Heat the wine and water hot, but not boiling; pour on the egg, stirring all the time. Put all into a porcelain-lined saucepan over a gentle fire, and stir one way till it thickens, but *do not let it boil.* Serve in a glass with crisp biscuits or toast.

Lemonade with Egg.—The juice of four lemons, the rinds of two (grated), half a pint of sherry, four eggs, six ounces of loaf sugar, one pint and a half of boiling water. Pare the rind thinly (or grate it), put it into a pitcher with the sugar, and pour the boiling water on it. Let it cool, then strain, and add the wine, lemon juice, and eggs, previously well beaten and strained. Mix all together and it is ready for use.

Savory Custard (Anderson's).—Add the yolks of two eggs to a cupful of beef tea, with pepper and salt to taste. Butter a cup or jam pot; pour the mixture into it, and let it stand in a pan of boiling water till the custard is set.

Milk for Puddings or Stewed Fruit (Ringer).—Boil a strip of

lemon and two cloves in a pint of milk; mix half a teaspoonful of arrowroot in a little cold milk, and add it to the boiling milk; stir it till about the consistency of cream. Have ready the yolks of three eggs beaten up well in a little milk. Take the hot milk off the fire and as it cools add the eggs and a tablespoonful of orange-flower water; stir it constantly till it is cool. Keep it in a very cool place till required for use.

A Nutritious Gruel.—Beat an egg to a froth; add a wine-glass of sherry, flavor with a strip of lemon, a little sugar, and grated nutmeg. Have ready some rice, or arrowroot gruel, or oatmeal gruel, very smooth and hot, stir in the wine and egg, and serve with crisp toast.

Caudle (Yeo).—Beat up an egg to a froth; add a glass of sherry and half a pint of gruel. Flavor with lemon peel, nutmeg, and sugar to taste.

Arrowroot Blanc-mange (Ringer).—Take two tablespoonfuls of arrowroot, three-quarters of a pint of milk, lemon, and sugar to taste. Mix the arrowroot with a little milk to a smooth batter; put the rest of the milk on the fire and let it boil; sweeten and flavor it, stirring all the time, till it thickens sufficiently. Put into a mould till quite cold. Serve with cream flavored with a little nutmeg.

Plain Oatmeal Gruel.—Two tablespoonfuls of oatmeal, one salt-spoonful of salt, scant teaspoonful of sugar, one cupful of boiling water, one cupful of milk. Mix the oatmeal, salt, and sugar together, and pour on the boiling water. Cook for thirty minutes; strain through a fine wire strainer to remove the hulls, place again on the stove, add the milk, and when just to the boiling point, serve hot. May add to this one tablespoonful of thick cream if desired.

Rice Gruel (Chambers).—Ground rice, two ounces; powdered cinnamon, quarter of an ounce; water, four pints. Boil forty minutes and add a teaspoonful of orange marmalade.

Rice Milk (Andersen).—Boil about two tablespoonfuls of rice in a pint and a half of new milk, and simmer, stirring it from time to time till the rice is quite tender. Have ready some apples, peeled, cored, and stewed to a pulp, and sweetened with a very little loaf sugar. Put the rice round a plate and the apple in the middle, and serve.

Rice Cream.—To a pint of new milk add a quarter of a pound of rice, a lump of butter the size of a walnut, a little lemon peel, a tablespoonful of powdered sugar. Boil them together for five minutes; then add half an ounce of isinglass which has been dissolved, and let the mixture cool. When cool, add half a pint of good cream whisked to a froth, mix together, and set it for a time in a very cool place, or on ice. When used, turn it out of the basin into a dish, and pour fruit juice around it, or some stewed apples, prunes, peaches, pears, or strawberries may be served with it.

Rice Cream.—Two tablespoonfuls of rice, two cups of milk, one salt-spoonful of salt, two tablespoonfuls of sugar, two eggs. Wash the

rice several times in cold water; cook it in a double boiler with the milk until the grains will mash. Three hours will generally be required to do this. Should the milk evaporate, restore the amount lost. When the rice is perfectly soft, press it through a coarse soup strainer or colander into a saucepan, return it to the fire, and while it is heating, beat the eggs, sugar, and a pinch of salt together until very light. When the rice boils, pour the eggs in rather slowly, stirring lightly with a spoon for three or four minutes, or until it coagulates, and the whole is like a thick, soft pudding; then remove from the fire, and pour it into a dish. By omitting the yolks and using the whites of the eggs only, a delicate cream is obtained.

Malt (Ground) and Rice Pudding (Yoe).—Stir an ounce of ground malt into a pint of boiling milk; strain through a sieve, and add the milk to two ounces of well-soaked rice. Mix well, and stand for ten minutes in a warm place, then bake for an hour.

Cracker Gruel.—Two tablespoonfuls of cracker crumbs, one scant salt-spoon of salt, one scant teaspoon of sugar, one cup of boiling water, one cup of fresh milk. To make the cracker crumbs, roll some crackers on a board until they are fine. (Water crackers are good, cream crackers are better.) Mix the salt and sugar with the crumbs; pour on the boiling water; put in the milk, and simmer it for two minutes. The gruel does not need long cooking, for the cracker crumbs are already thoroughly cooked. Serve without straining it.

Indian Meal Gruel.—Two teaspoonfuls of corn-meal, one tablespoonful of flour, one teaspoonful of salt, one teaspoonful of sugar, one quart of boiling water, one cup of milk. Mix the corn-meal, flour, salt, and sugar into a thin paste with cold water, and pour into it the boiling water. Cook it in a double boiler for three hours. No less time than that will cook the corn-meal thoroughly. Then add the milk, and it is ready now to serve.

Milk Porridge.—Milk, eight pints; flour, twelve ounces; water, three pints. (This is a hospital recipe, and may use only one-fourth, etc.) The flour to be used for milk porridge should be previously prepared by being tied up closely in a bag and boiled four or five hours. It then can be grated to a powder, which should be mixed into a smooth paste with cold water. Add to the milk the prescribed quantity of water, and stir in the flour, with a little salt. Let it boil ten minutes, stirring all the time. Serve hot.

Fothergill's Amylaceous Food.—Of rice, well washed, of arrow-root, of tapioca, and pearl barley, take of each an ounce, add two quarts of water, and boil down to a quart; then flavor with candied eringo or any flavoring desired.

Barley Jelly (Eustace Smith).—Put two tablespoonfuls of washed pearl barley into a pint and a half of water, and slowly boil down to a pint; strain, and let the liquid settle into a jelly. Two teaspoonfuls of this dissolved in eight ounces of warmed and sweetened milk are enough for a single feeding, and such a meal may be allowed twice a day.

Almond Cakes for Diabetics (Seegen).—Take of blanched sweet almonds a quarter of a pound, beat them as fine as possible in a stone mortar; remove the sugar contained in this meal by putting it into a linen bag and steeping it for a quarter of an hour in boiling water acidulated with vinegar (apple vinegar); mix this paste thoroughly with three ounces of butter and two eggs. Next add the yolks of three eggs and a little salt, and stir well for some time. Whip up the whites of three eggs and stir in. Put the dough thus obtained in greased moulds and dry by a slow fire.

Port Wine Jelly (Ringer).—Put into a jar one pint of port wine, two ounces of gum arabic, two ounces of isinglass, two ounces of powdered white sugar candy, a quarter of a nutmeg grated fine, and a small piece of cinnamon. Let this stand closely covered all night. The next day put the jar into boiling water and let it simmer until all is dissolved, then strain, let stand till cold, and then cut into small pieces for use.

To Make a Flaxseed Poultice.—The water should be boiling hot in a vessel suitable to the size of the poultice to be made. Stir into the boiling water, slowly, enough ground flaxseed to the consistency of soft porridge (that is, so it will spread smoothly). Cook rapidly for two or three minutes. Should it become a thick paste, add a little boiling water to thin it down to the desired consistency. Spread between cheese-cloth, and apply as hot as can be borne.

Bread-and-milk poultice is made with bread crumbs stirred in boiling fresh milk in the same manner as the flaxseed meal is used, as prescribed above.

CHAPTER LXVIII.

ASTHMA, COLDS, HAY-FEVER, TONSILLITIS.

ASTHMA.

Definition.—A paroxysmal disturbance of the respiratory organs, sometimes periodic, with entirely or comparatively free respiration during the intervals between the attacks.

Etiology.—Asthma is considered to be often congenital, as it frequently occurs in certain families in which neurasthenia, hysteria, neuralgia, and gout are common.

Salter thinks that hereditary influences are a predisposing cause, since in more than two-fifths of two hundred and seventy cases he finds distinct traces of inheritance, direct or lateral, immediate or remote.

Males are thought to be more liable than females, because they are more exposed to the various exciting causes,—the weather and its vicissitudes, for instance.

It is more common in the upper classes than in the lower, probably because of the nervous system being more sensitive.

Chief among the exciting causes is bronchitis, either simple or as a manifestation of whooping-cough or measles. A sharp attack of bronchitis in a child may give rise to asthma or difficult breathing, greatly resembling asthma. The exciting causes appear to be intimately connected with climate.

Residence in a given locality may be helpful to the one and injurious to the other. The influence of climate does not depend upon the degree of moisture or the range of temperature, but oftener upon peculiarities of the individual, since a moist climate and cold weather are beneficial to some and injurious to others. That which is sure to bring it on in one may have no appreciable influence over another. Among these are dust and fog, smoke, fumes and vapors from animals, odors from flowers. In certain cases the attack of asthma is regarded as the result of a reflex irritation of the nerves of respiration from disease of the stomach or of the intestinal tract, hence dyspeptic or nervous asthma.

Symptoms.—In some cases there is nothing suggestive of an attack of asthma, for instance, being suddenly wakened out of a sound sleep at night with sharp attack of difficult breathing (a paroxysm of dyspnœa), a sense of thoracic constriction, a suffocating feeling. Patient sits upright, and breathes violently, but not rapidly, the inspiration usually being short and deep, and the expiration pro-

longed. In other cases inspiration may be comparatively easy and expiration especially labored. The attack of dyspnœa may continue for minutes or hours; relief often comes with the expulsion of the sputum. The cough is at first slight and dry, but becomes paroxysmal and forcible in the efforts to raise secretion, the presence of which in the lungs is often made evident by moist rales. The sputum is viscid, grayish white, scanty, or profuse. As the breathing becomes easier, the patient feels exhausted, falls asleep, and awakes apparently well, at the most somewhat fatigued. Other attacks are likely to occur in the course of successive days or at intervals of a number of days or weeks, during which there is more or less cough between the attacks. Longer or shorter intervals of freedom from it, lasting months or years, may then follow, or the attacks are of such frequent occurrence that pulmonary emphysema (an excessive dilatation of the air cells, admitting air into the areola tissues), and eventually dilatation of the heart, results.

Diagnosis.—This may be difficult. Difficult breathing, affecting both lungs, is an important characteristic of bronchial asthma, by means of which other causes of recurrent attacks of difficult breathing, except in emphysema, chronic bronchitis, and cardiac asthma, may be excluded. In cardiac asthma the difficult breathing (dyspnœa affects both inspiration and expiration. Rales are absent unless pulmonary œdema occurs as a complication. The attack usually appears during the evening or night, often waking out of a sound sleep. The child sits up in bed, is restless, and instinctively seeks to overcome the struggle for breath by grasping the bedclothes or some other object, thus facilitating the action of the accessory muscles of respiration. The patient may have had symptoms of a trifling cold the previous day. The face is pale, and has an anxious look; the skin is moist and cool; there is no fever; the pulse is rapid and often irregular; the respiration is slow and labored, expiration much prolonged. Cough, if present, is short and dry. Towards the end of the attack a little tough and viscid white mucus may be expelled. The fit, after lasting a variable time, may go nearly or quite as rapidly as it came, the patient falling asleep, and waking in the morning about as well as usual. In case of bronchial or catarrhal cases, the cough is less dry and more frequent. A fresh attack of bronchitis brings the asthma anew.

Prognosis.—This is better, so stated, in children than in adults. A strong hereditary predisposition does not in itself preclude recovery.

Treatment.—Is prophylaxis, or the prevention of the affection in those presumably predisposed, and the prevention of the recurrence of attacks in those who have already experienced them, and palliative treatment of the paroxysm itself, as the attack sometimes depends upon a removable cause, especially upon the presence of polypi or other obstructive lesions of the nose. The urine also should be examined, to prevent the overlooking of uræmic origin. As an attack may

be due to inflammation of the lungs or bronchials, a favorable climate should be sought; when it is possible, a warm, dry climate is best in some cases, and others must have a warm, moist climate. Each individual case should be studied in choosing a climate suited to its special condition.

The general hygienic management should be that of chronic bronchial catarrh, though, in children, the use of meat or other highly-nitrogenous foods should be restricted.

No diet which produces indigestion or flatulence is suitable for the asthmatic. If, however, an almost purely meat diet is the only one digested, it should be the only one allowed. Furthermore, the heavy meal should always be taken in the middle of the day, and the supper should be made very light, so that the digestion may be completed by bedtime. In children, a simple and highly-nutritious diet, and careful attention to house ventilation, both of living and of sleeping rooms, should be combined. The child should be guarded against whooping-cough and measles; with this, woolen clothing should be worn.

Enlargement of the bronchial glands, or bronchitis, calls for cod-liver oil and the iodide of iron—the syrup of the iodide of iron if the tongue is clean and the digestion fairly good, from three to five drops for a child eight or ten years old. Arsenic is of value in some cases, but should be prescribed by the family physician. Potassium iodide is beneficial in many cases, and should be given for about three months, in ascending doses up to the point of tolerance. (Wood.) The dose for an adult is from two to seven grains, after meals, given in milk or in syrup of sarsaparilla. In syphilitic cases as high as ten grains in milk after meals, three times a day, is especially useful. Bromide of sodium and bromide of ammonium with antipyrine are prescribed for nervousness in asthmatic cases. Ten grains of bromide of sodium, with five grains of antipyrine, every four or six hours till quiet. The inhalation of compressed air in the pneumatic cabinet is highly spoken of by some writers.

Palliation.—The treatment of the paroxysm varies according as the special case is of the spasmodic type or of the catarrhal variety, and in the latter according to the amount of secretion. Chloroform and ether arrest the fits, but only temporarily, the attack returning as the paroxysm passes off. Chloral, with potassium bromide, five grains of each, well diluted in water or milk for an adult, renders excellent service, and may be given to children according to the age. One to two grains may be given to a child eight years old. Nitre-paper is a time-honored remedy, the inhalation of the fumes through a paper cone. Inhalation of the iodide of ethyl is highly recommended by See; ten minims can be safely used for a child. (Shattuck, M. D.) Trousseau recommends belladonna, and lobelia is highly spoken of by some. The patented powders and pastilles which are used among the laity, and which, it must be confessed, are often efficacious, con-

tain nitre, stramonium, and lobelia. Berkart recommends pilocarpine, one-eighth to one-tenth of a grain being given to children (hypodermically) five years of age.

In catarrhal cases, in children, an emetic such as ipecac will clear out the bronchial tubes, relax spasms, and materially relieve the breathing. No true asthmatic paroxysm can withstand the depressant effect of nausea.

Quick relief is often obtained by sipping very hot water till the paroxysm subsides; then take from five to eight grains of Dover's powders, with three grains of quinine. An eighth to one-fourth of a grain of calomel is one dose for an adult; it may be given to children, according to the age. Usually one dose is sufficient to relieve the paroxysm. Should the fit return before the powders have any effect, the sipping of hot water may be repeated, with a little whisky added to the water. On waking up after taking the Dover powder, the patient may drink a cup of black coffee, not too weak, to relieve the unpleasant effect of the powder.

ACUTE COLD IN THE HEAD, RHINITIS, ACUTE NASAL CATARRH, CORYZA.

Etiology.—Acute cold in the head is often the result of exposure to draughts of air, to cold or wet weather. The irritation from bacteria is suggested by the occurrence of epidemics of acute nasal catarrh. Taking cold from exposure to cold and damp is said to be due to bacterial action, the growth of the bacteria being favored by the disturbance in the circulation in the nostrils produced by the exposure.

Symptoms.—Frequent sneezing and increasing obstruction of the nostrils are the significant symptoms of acute cold or rhinitis. These are frequently preceded by chilly sensations, followed by slight fever. There is at first a profuse watery secretion from the nasal mucous membrane; later it is slimy, and finally opaque yellow. The sense of smell and taste is impaired, if not lost for a time.

Treatment.—Acute coryza does not necessarily require very close confinement to the house, but in delicate children and very old people it may be necessary to put the patient to bed. At the beginning of the cold a full dose of quinine (from five to ten grains, with about four grains of Dover's powder, and a half grain of calomel and soda) for an adult will usually arrest or modify the attack. Quinine should be taken in two-grain doses three times a day throughout the course of the attack. Snuff powder for the nose, made as follows, is very effective in breaking up an acute cold in the head:—

℞: Bismuth subnitrate.....3j
Talcum.....3j
Morphiæ sulphas.....gr. iiss
Pulv. gum camphor.....gr. ijss

M. ft. Chart. in powders, No. xii.

Sig.: Divide the powder; snuff it up the nose night and morning.

Keep the bowels moving, not too freely, with castor oil or syrup of rhubarb, or some mild laxative.

To break up a general cold, that is to say, where the entire body or part of the body are suffering from aching pains in the limbs or pain in the chest, calls for quinine and whisky, to be taken every four hours (quinine in two-grain capsules and a tablespoonful of whisky). Keep the bowels moving daily, and a dose of calomel at the onset of the cold aids in breaking up the trouble (one to two grains at bedtime, with a little soda, followed with a heaping teaspoonful of salts on the following morning). Confinement in a warm room is essential in most all cases till the affection is overcome. Should a cough result from the cold, the following cough mixture will give quick relief:—

℞: Tr. hyoscyami.....3ij
Ammon. muriate.....3j
Syr. scillæ.....3jss
Camph. Tr. opii.....3jss
Syr. prunus Virg.....3iv
Spt. frumenti, q. s.....3viij

M. et sig.: For cough and cold.

Teaspoonful to be taken every two or three hours till well of the cold.

HAY-FEVER.

Synonyms.—Hay or rose cold, summer or autumnal catarrh, hay-asthma, etc.

Definition.—Hay-fever is an affection of the naso-pharyngeal mucous membrane, recurring annually and periodically, characterized by irritation and redness of, and flux from, the mucous membranes of the eyes, nose, throat, and bronchi.

Etiology.—This affection has been designated June cold, hay-asthma, etc., and its origin is attributed to the pollen of certain grasses and cereals. In 1872 Dr. Morrill Wyman, of Cambridge, in common with many members of his family, a sufferer, published his highly interesting and important monograph, based on an analysis of eighty-one cases, in which was made conspicuous the more serious autumnal catarrh, closely allied to June cold in method of origin and symptoms. Essential in the production of both is a nervous temperament, exposure to the exciting causes, and excessive sensitiveness of the nasal mucous membrane. The nervous temperament is often inherited. The inhalation of various irritants often produces an attack of coryza or asthma in sufferers from the periodical catarrh. Hay-fever is considered to be a pure neurosis in all cases in which there are no notable nasal lesions persistent between the paroxysms.

Symptoms and Course.—The date on which the symptoms begin to recur each year is in some cases absolutely definite, though in the large majority there is a variation of a few days or more. In some there is a prodromal stage, lasting one or two weeks, during which

there may be more or less nervous irritability, or alternating sensations of heat and cold, or a feeling of lassitude. In other cases there is no prodromal stage.

As the first symptoms, at or about the stated dates the patient notices an itching in the mouth, nose, or throat, and a sense of fulness or weight in the frontal region. In the course of a day or two there is an itching of the eyelids, which are puffy, and the nasal mucous membrane becomes swollen, reddened, and so irritated that a violent attack of sneezing results, which is accompanied by a profuse watery discharge from the nostrils, often continuing throughout the day; there are also redness and swelling of the face in the morning, and impairment, or even loss, of the special senses of smell, taste, and hearing. Itching of the scalp and of the skin of the back or chest, a tendency of the skin to become easily excoriated, and, when excoriated, to heal slowly, and more or less general depression of the system, with lack of appetite and quickening of the pulse-rate, are often experienced during this period, which lasts from ten days to two weeks. The irritation now extends to the bronchial mucous membrane, exciting a short, annoying cough, which results in but little expectoration, and that of transparent, glairy mucus. The cough is worse in dry than in damp, wet weather, at night than during the day, and increases for a week or ten days. During the fourth week the early symptoms are apt to diminish; but the cough persists, and asthma, if it comes at all, now appears, intensifying the misery of the night. During the fifth and sixth weeks there is a gradual decline of the symptoms, and the patient soon after regains health and strength, until the time of periodical recurrence comes round again the following year.

Prognosis.—Dr. Wyman says that as regards expectation of life, this is good. Hay-fever patients seem to live as long as those who are free from the infirmity.

Treatment.—"It is maintained by various specialists that local treatment will suffice to cure a large percentage of cases,—a statement which, however, still needs confirmation." (Wood.) The local curative treatment consists in the persistent use of the galvanic current, applied in the same manner as in cases of nasal catarrh, and in the surgical removal of deformities, the destruction by cauterization of sensitive portions of mucous membrane, and the use of various local applications. A specialist of great skill in the use of instruments is required in this disease. Quinine is useful. Dover's powder (five grains), with one-fourth of a grain of calomel at bedtime, is beneficial in some cases. It may be given according to the age of the patient.

The local palliative treatment consists in the employment of certain drugs. Wood recommends a solution of potassium bromide (ten grains to the ounce of water), which may at first be carefully applied to sensitive spots, afterward more freely used, and also increased a little in strength. The free use of cocaine in hay-fever by the means of a spray (four per cent solution) will almost invariably give tem-

porary relief. The excessive violence of the asthmatic paroxysms of hay-fever may call for hypodermic injections of morphine with atropine; but their use is attended with danger of the narcotic habit.

The climatic treatment of hay-fever is said to be almost invariably successful in preventing the attacks during the treatment. A certain degree of elevation above the sea is often effective. When it is in the power of the patient to do so, it is well to change locality, going to the seashore or a mountain resort, whichever experience has proved to give immunity to the particular individual. It is desirable to go shortly before the time of the expected attack, and to remain at least six weeks, after which time the danger for that year is practically over. The leading resorts are the Catskills, portions of the Green and Adirondack Mountains, Cresson, Pennsylvania, and Deer Park, Maryland. The White Mountain resorts are Bethlehem, Jefferson, Gorham, the Twin Mountain House, and the Glen. Beach Haven and Fire Island are noted American resorts.

TONSILLITIS, OR QUINSY.

Acute Tonsillitis.—As described, tonsillitis is an acute inflammation of the tonsil or tonsils, or acute quinsy, which may be superficial, and may terminate in resolution, suppuration, or chronic enlargement.

Acute Superficial Tonsillitis.—This disease is often due to sudden or prolonged exposure to cold or wet, or to improper food, and an overheated, vitiated atmosphere. A healthy child complains more or less of weariness and general malaise. It seems fretful, drooping, and out of sorts. Frequently there are headache, nausea, or vomiting, chilly sensations, and some elevation of temperature. The bilious condition may be very marked; the coated tongue and stomachic disturbance may last during several days; with these symptoms the child complains of slight heat or pain in the throat and difficulty of swallowing. The pain at first is complained of at the angle of the jaw. Here there is often slight swelling of the lymphatic ganglia; there is pain on pressure in this region, indicating where the inflammation exists.

When there is marked swelling of the tonsils, the voice assumes a nasal intonation. There is often occasional cough, with frequent painful expectoration of viscous and stringy mucus, which collects in the throat. If the child is very young, it swallows the mucus. There is thirst; the breath is foul; the bowels are constipated. The urine is small in quantity, high-colored, and loaded with urates. The breath is accelerated, the pulse rapid and full. The fever rises rapidly, and in a few hours may reach 102° or 103° Fahrenheit. The pulse ranges from one hundred and ten to one hundred and thirty per minute.

Course, Duration, and Termination.—In mild cases of tonsillitis convalescence usually begins in three or four days, and the swelling of the tonsils disappears in the course of a week. In severest cases,

to which the name quinsy is especially applied, an abscess forms in the inflamed tonsil. On the third or fourth day of the tonsillitis, the enlarged tonsil becomes soft and fluctuant. The abscess may break suddenly, usually into the mouth or the pharynx, when the local symptoms often at once disappear, and rapid relief follows.

Treatment.—The first indication in the treatment of acute tonsillitis in children is to obtain a free evacuation of the bowels. Give from half a grain to one or two grains of calomel in tablet form (according to the age of the patient) dissolved (or not) in a little water, and followed in three hours by a dessert-spoonful of Rochelle salts in half a tumbler of water. Small doses of sulphate of magnesia (Epsom salts), with quinine two grains, repeated three or four times in twenty-four hours, are also very useful.

The following is a good formula:—

℞: Magnesia sulph.....℥iij
Quinæ sulph.....gr. vi
Acid. sulphurici dil.....gtt. xx
Syr. zingiberis.....℥ss
Syr. liquorice, ad.....℥iij

M. sig.: Give a dessert-spoonful every three hours to a child three or four years of age.

When the bowels have been relieved, one-fourth to one-half drop doses of aconite may be given. Put one drop of aconite in two or four teaspoonfuls of water, and of this give a teaspoonful every half hour. This will very soon diminish temperature, and lower the pulse and respiration, while it increases the action of the skin, and thus promotes speedy relief.

Cohen[1] advises the use of the ammoniated tincture of guaiacum topically, in the form of a gargle, with cinchona, honey, and chlorate of potassium. The salicylate of sodium, given in two to four-grain doses in milk, according to the age of the patient, will soon cut short the disease, and prevent suppuration. Poultices of flaxseed applied very hot every fifteen minutes at the outset of the disease, will very often aid in cutting it short. They should be applied for several hours in succession. When the poultices are removed, keep the throat protected with cotton batting or a silk handkerchief.

During the acute stage of tonsillitis, the child should be confined to bed, and allowed light diet, such as milk, eggs, gruel, soups, milk toast, rice pudding, custard, etc. In young children a glass of port-wine, given quite at the beginning of the attack, is said often to have power to abort it. (Eustace Smith.)

Locally, gargles are often used with comfort.

[1]Pepper's System of Medicine, vol. ii, p. 388.

℞: Thymol.....gtt. ij
Acid carbol. liq.....℥xx
Boracis.....ʒj
Glycerini.....ʒvi
Aquæ, ad.....ℨvi

M. sig.: Use as a gargle, or with the atomizer, every hour or two.

In quinsy all that can be done to avoid the formation of pus is to cleanse the throat with a very dilute solution of hydrogen peroxide or thymol. Use a mouth-wash as above prescribed, and poultice the throat as already advised. If pus forms, it should be evacuated as soon as possible. If the abscess is in the soft palate, a little above and on the outside of the margin of the tonsil, the incision should be through the soft palate, just outside of, and parallel to, the anterior pillar, and in the neighborhood of the line of the upper margin of the tonsil. When the tendency is for the pus to escape through the crypt of the tonsil, the incision should be made into the tonsil, as near as possible to the natural outlet of the pus.

For the relief of pain, codine, sulphonal, or trional should be prescribed in doses suited to the case, for sleeplessness. Of codine, give from one-fourth to one-sixth of a grain to a child ten to fifteen years of age; of sulphonal, two to four grains to a child eight to twelve years of age. The dose may be repeated every six hours for restlessness.

Gude's peptomanganate should be given for constitutional treatment, as prescribed on the bottle; doses suited to the age of the patient.

GLOSSARY

Abduction: The movement which separates a limb or other part from the axis of the body.
Acetabula: Cavity cup-shaped, situated in the os innominatum.
Acne; An eruption occurring most frequently on the face.
Adduction: The action by which parts are drawn towards the axis of the body.
Adynamic: Appertaining to debility of the vital powers.
Adynamic: Debility of the vital organs.
Aglobulism: A diminution of the amount of hemogloblin in the blood.
Albuminu'ria: A condition of the urine in which it contains albumin.
Amenorrhoe'a: Suppression of the menses.
Amnii: Membrane around fœtus.
Amorphos; Having no determined form.
Ampulla: A membrane bag shaped like a leather bottle.
Amyloid; Resembling starch.
Anemia; Bloodlessness.
Anesthesia: Privation of sensation.
Anasarca: Dropsy of subcutaneous cellular tissue.
Aneurism: A soft, pulsating tumor arising from dilatation or rupture of an artery.
Angina: Any inflammatory affection of the throat.
Angioma: A tumor composed mainly of new blood-vessels.
Ankylosis: An affection in which there is great difficulty, or even impossibility, of moving a joint, which remains in a constant state of flexion.
Anu'coccygeal: Pertaining to the anus.
Anodynes: Those medicines which relieve pain.
Anomalous; Irregular.
Anorexia: Want of appetite.
Anterior: Situated before.
Anteflexion; Bending before.
Anthropom'etry: Measuring the dimensions of the different parts of the body.
Antiphlogist'ic: Opposed to inflammation.
Antipyretic: A febrifuge; a medicine to allay fever.
Antipyret'ic: Opposed to fever.
Antipyretics; Efficacious in preventing fever.
Anus; The posterior opening of the alimentary canal.
Aphasia; Sleeplessness.
Aphonia: Privation or loss of voice.
Aphthous; Pertaining to sore mouth.
Aplasia: Defective or arrested growth of tissue.
Apposition; Adding an artificial part.
Arbores'cent: Resembling a tree.
Arte'rioles: Small arteries.
Arthritis: Inflammation of joints.
Articulation: The union of bones with each other; a movable articulation.
Aryt'enoid: Two small cartilages at the top of the larynx.
Ascaridae; Intestinal worms.
Asepsis; Preventing putrefaction.
Asphyx'ia: A stoppage of the pulse.
Aspirate: Drawing off the fluid contents of tumors with an instrument called an aspirator.
Aspirator; Instrument for evacuating fluid from tumors.
Astrag'alus: A short bone situated at the superior and middle part of the tarsus, where it is articulated with the tibia.
Astringent: Puckering.
Atelecta'sis: Imperfect dilatation.
At'omy: Want of tone.
Atrium; An auricle of the heart.
Atro'pine: A poison remarkable for its power in dilating the pupil of the eye.
Atresia: Growing together.
Ausculta'tion: Detecting disease by sound.
Axilla; The armpit.
Bacillus; A genus of bacteria.
Bacteria; Minute vegetable organisms found in decayed matter.
Bifurcate; To divide into two branches.
Blennorrha'gia: Relating to gonorrhea.
Bougie: A rubber sound.
Bouillon: A nutritious liquid food made by boiling beef or other meat in water.
Branny: Consisting of bran.
Bryant's Triangle: A triangle having for its hypothenuse, or longest line, a line drawn from the anterior-superior

iliac spine to the great trochanter of the thigh bone.

Buccal: Pertaining to the mouth or cheek.

Bulbar: Pertaining to the medulla oblongata.

Bulla: A vesicle or an elevation of the cuticle containing a transparent watery fluid.

Cachetic: A morbid condition of the body.

Calcane'um: The largest of the tarsal bones; that which forms the heel.

Calculus: A concretion on any part of the body.

Capsule (has several meanings): A membranous, fibrous, and elastic bag or capsule, of a whitish consistence, which surrounds the joints.

Carcinoma: Incipient cancer.

Carpal: Belonging to the carpus, or wrist, as carpal joints.

Cartilage: A solid part of the animal body, of medium consistence between bone and ligament. In adults it exists only in the joints, at the extremities of the ribs, etc.

Casein: Cheese.

Catalepsy: An affection generally connected with hysteria.

Catamenial: Relating to menses.

Catheter: A curved instrument introduced into the bladder through the urethra for drawing off the urine.

Catheterization: To introduce the catheter to probe.

Cauterize: To burn.

Cephalitis: Inflammation of the brain.

Cerebritis: Inflammation of the cerebrum.

Cerulean: Dark colored, blue.

Cervix-uteri; The neck of the womb.

Chalybeate: To impregnate with iron.

Chlorosis: A disease affecting young females near the period of puberty.

Choane: The infundibulum of the brain.

Cholagogue: A substance which promotes the flow of bile.

Cholesterin: An inodorous, insipid substance in white, shining scales.

Chorea: A nervous disease.

Chorion: The thin, transparent membrane which surrounds the fœtus in utero.

Cicatricial: Relating to a seam.

Cicatrice: A pellicle formed over a wound, subsequently contracted into a scar.

Cirrhosis: A yellow coloring matter, sometimes secreted in the tissues.

Clavicle: The collar bone. It is shaped like the letter S, and is situated transversely at the upper part of the thorax.

Clitoris: The erectile organ of the female.

Climacteric: The time when menses cease.

Colotomy: The operation of cutting into the colon.

Coma; A state of profound insensibility.

Comatose; Relating to or resembling coma.

Concomitant: Attending; conjoined.

Condyle: An articular eminence round in one direction, flat in the other.

Condylo'ma: Soft, fleshy excrescences of an indolent character.

Congenital: Produced or existing at birth.

Contusion: An injury which presents no loss of substance, and no apparent wound.

Cor'acoid: A short, thick process situated at the anterior part of the upper margin of the scapula; it resembles the beak of a crow.

Corium: The deep layer of mucous membrane beneath the epithelium.

Cornu: A horny excrescence.

Cor'onoid: A sharp process situated at the superior part of the ulna, and forming a part of the hinge of the elbow joint.

Coryza: Inflammation of membrane lining of the nose.

Costal: Relating to a rib.

Crypt: The simple tubular glands of the small intestines.

Cuboid: Relates to one of the bones of the tarsus.

Cul-de-sac: A blind alley.

Curetting; Cleansing.

Cyanic: Blue stage of a disease.

Cyanosis: From insufficient aeration of the blood, the body becomes blue.

Cyanotic: A more or less livid color at the surface of the body due to imperfect circulation.

Cystinuria; Urine, cystinic.

Cystitis: Disease of bladder.

Cystocele: A tumor.

Cys'toscope: A catheter.

Cystot'ic: Relating to contraction of the heart.

Cystot'omy: Cutting into the bladder for any purpose.

Decidual: Relating to a falling off from the uterus.

Decubitis: Assuming a horizontal posture.

Decubitus; An attitude assumed in lying down.

Decussate; Crossed; intersected.

Defecation: The act of extruding excrement.

Deferves'cence: Decrease of fever or feverish symptoms.

Deglutí'tion: The act of swallowing food.

Dentition: Teething.
Desquamation: Exfoliation, or scaling off of the scarf-skin.
Diachylon: A plaster originally composed of juices of several plants, but now made of an oxide of silver, lead, and oil.
Diaphoretic: A medicine which prompts perspiration.
Diaphoretics: Medicines which excite diaphoresis, or perspiration.
Diaphysis: Anything that separates two bodies.
Diathesis: A predisposition to some diseases rather than others.
Dietetic: Rules, regulations, kind, and variety of food eaten.
Dilatation: The enlargement of some physical organ.
Diluents: Medicines augmenting fluidity of the body.
Diuretic: Medicine that increases the secretion of the urine.
Diuretics: Medicines which increase the secretion of the urine.
Dorsum: Posterior part of the trunk, extending from the inferior and posterior region of the neck as far as the loins.
Duodeni'tis: Inflammation of the duodenum.
Dyscra'sia: A bad habit of the body.
Dyspnoe'ic: Short-breathed.
Dysuria: Difficulty of passing the urine.
Ec'chymose: To discolor by the production or effusion of blood beneath the skin.
Eclamp'sia: Convulsion, as the convulsions of children.
Eczema: An inflammation of the skin, attended with considerable disturbance.
Effusion: The pouring out of blood or of any fluid into the areolar membrane, or into the cavities of the body.
Embolism: Obstruction produced by a clot or foreign body brought from a distance.
Emetics: Substances capable of producing vomiting.
Emollient: An external softening or soothing application to allay irritation.
Empyema: A collection of blood or pus in some cavity of the body.
Empysema: A tumor caused by introducing air into the areolar tissue.
Endemic: Peculiar to a locality or class of persons.
Endocardi'tis: Inflammation of the endocardium.
Endocervi'tis: Inflammation of the neck of the uterus.
Endometri'tis: Inflammation of the uterus.
Endome'trium: Lining membrane of the uterus.
Endoscope: An instrument for inspecting internal parts.
Enemata: Injections.
Enter'ic: Intestinal.
Epigastric: Pertaining to the upper and anterior part of the abdomen.
Epigas'trium: Over the belly.
Epilepsy: Loss of consciousness attended with little or no muscular disturbance.
Epileptiform: Of the nature of paroxysms of the brain.
Epiphy'sis: Any portion of a bone separated from the body of the bone by a cartilage, which becomes converted into bone by age.
Epistaxis: Bleeding from the nose.
Epithelial: Of or pertaining to epithelium.
Epithelio'ma: A morbid condition of the thin epidermis; cancerous.
Epithelium: The thin skin covering a membrane.
Erotic: Melancholy, that which is produced by love.
Erotomania: A species of mental alienation caused by love.
Eructation: A belching of wind from the stomach.
Erythema: A disease of the skin.
Eschar: A crust or scab.
Etiological: Inquiring into causes.
Etiology: The doctrine of causes of diseases.
Exacerbation: An increase in the symptoms of a disease.
Exanthematous: Characterized by efflorescence of the skin.
Excised: Cut out or off.
Excoriated: Abraded; galled.
Excoriation: A slight wound remaining in the skin.
Exfoliation: Throwing off of dead portions of scales.
Exsected: Cut off or away.
Extravasation: Effusion; emptying or forcing a fluid out of its proper vessels.
Farinaceous: Consisting of meal and flour.
Fascia: A band, sash, or fillet, especially in surgery; a bandage.
Fascia: A band, sash, or fillet, especially mists to an aponeurosis and to a muscle.
Fastigium: The extreme point or front of the head.
Feces: Matter excreted.
Febricula: A slight and short fever, especially when of obscure causation.

Febrile; Relating to a fever.
Femur: The thigh; the strongest and longest bone in the body.
Fibroid: Like a tumor.
Fibula: The long, small bone situated at the outer part of the leg.
Fimbria: The fringed extremity of the Fallopian tube.
Fissure: A fracture in which the bone is cracked as in fracture; also a sort of chap observed on the hand, etc.
Fistula: A permanent abnormal opening into the soft parts, with constant discharge.
Fixed: To fasten.
Flatus: Flatulence.
Fontanel: The opening of the head.
Fornix: A medullary body in the brain.
Fruc'tifying: Fertilizing.
Fundus; The base of an organ that ends in a neck.
Ganglion; A knot-like enlargement in the course of a nerve; it is also applied to tumors situated somewhere on a tendon.
Gastrodyn'ia: A pain in the stomach.
Genital; Pertaining to generation, or to the generative organs.
Gestation; The period of pregnancy.
Ginglymus: Like a hinge; admitting of motion in two directions only.
Gonorrhe'al: Relating to a flow from the membranes of the urethra.
Gynaecol'ogist: One skilled in science of diseases peculiar to women.
Hem'atocele: A tumor formed by the blood.
Hemato'ma: Bloody tumor on the scalp of a newborn child.
Hematozo'a: Entosia in the blood.
Hematu'ria: Voiding of blood by urine.
Hemastat'ics: Stopping or preventing hemorrhage.
Hematosis; The formation of blood in general.
Hemiphle'gia: Paralysis of one side of the body.
Hemophilie: A congenital morbid condition characterized by a tendency to bleed immoderately.
Hemorrhoids: Common piles.
Hepatic; Like or pertaining to the liver.
Hernia; Rupture.
Hermaph'rodism: Relation to union of both sexes in one.
Her'pes: An eruption on the skin in small, distinct clusters.
Horripilation; Chilliness preceding a fever, accompanied by bristling of the hair all over the body.
Humerus: The cylindrical irregular bone of the arm, the upper extremity of which has a hemispherical head connected with the scapula.
Hydatid'iform: Having the form of water vesicles within the head.
Hydroceph'alus: A collection of water.
Hydronephro'sis: An accumulation of its secretion in the kidneys.
Hydrosalpinx: An accumulation of liquid in a Fallopian tube.
Hy'men: The semilunar, parabolic, or circular fold situated at the outer orifice of the vagina in virgins.
Hyperesthe'sia: Over-sensitive.
Hypererethis'ia: Excessively irritable.
Hyperplasia; An increase in or excessive growth of the normal elements of any part.
Hypertrophied; An enlargement of a part of the body from excessive nutrition.
Hypertrophy; A state of a part in which the nutrition is performed with greater activity.
Hyperpyrex'ia: A high degree of fever.
Hypodermic: That which is under the skin.
Hypogastrium; The lower part of abdomen.
Hypostasis; A morbid deposition in the body; sediment.
Hypostatic: That which is deposited at the bottom of a fluid.
Hysterectomy; The excision of the uterus.
Ichorous: Thin, watery serous.
Icterus: A disease the principal symptoms of which are yellowness of the skin and eyes, with white fæces and high-colored urine.
Idiopath'ic: Primary affections and their symptoms.
Ileo-caecal: Of or pertaining to the ileum and cæcum.
Iliac; Name given to arteries, muscles, relating to the flanks, etc.
Ilium: The largest of the three bones which constitute the os innominatum in the fœtus and child.
Immobile: Immovable.
Impeti'go: A cutaneous pustular eruption not attended with fever, usually a kind of eczema with pustulation.
Impaction: A collision; a fracture with depression of some fragments and projection of others externally.
Imperforate; Not perforated.
Incapsulation: Putting one inside of another.
Incontinent; Unable to restrain natural discharges or evacuations.
Incubation: Hatching.
Induration: The hardness which supervenes occasionally in an inflamed part.
Infiltration; Passage of blood into an areolar membrane.

Infravag'inal: Below the vaginal junction.
Inhibitory: Prohibitory; to hold in restraint.
Inspis'sant: Any remedial agent that renders the blood thicker, directly or indirectly.
Interstitial: Applied to that which is in the interstices of an organ, pregnancy, etc.
Intussusception: Generally it is the upper part of the small intestines, which is received into the lower.
Inversion: To turn.
Ischium: The lower part of pelvis.
Intermenstrual: Occurring between menstrual periods.
I'tis: Inflammation.
Jactation: Extreme anxiety; excessive restlessness.
Koumiss or Kumyss: A beverage used in families of the people of Tartary. It resembles sour buttermilk, without being greasy.
Kumiss: A slightly alcoholic drink prepared from milk with sugar and yeast.
La'bium: Lip.
Laceration: Tearing.
Lactation: The secretion and yielding of milk.
Laminae: Scales of bone.
Laparot'omy: Incision into the abdomen.
Lesion: Any morbid change in structure of organs.
Leucorrhoe'a: Flow of a white, yellowish, or greenish mucus.
Leucomaine: A nitrogenous organic base of alkaloid produced in living animal tissues as a result of their activity.
Leva'tor A'ni: Lifter of the anus.
Lithemia: An excess of uric acid in the blood.
Litharge: A yellowish-red substance obtained as an amorphous powder.
Lumbar: Belonging or having reference to bone, muscles, and nerves.
Lumbricoid: Resembling an earthworm.
Lymphadeni'tis: Inflammation of the lymphatic gland.
Ly'sis: The gradual recession of a disease, which is operated insensibly.
Magnum Os (great bone): The largest bone of the carpus.
Malaise: Indisposition.
Malleolar: Belonging or relating to the ankles.
Mammae: The breasts; udder.
Massage: The art of applying intermittent pressure and strain to the muscles and other tissue; to knead.
Masti'tis: Inflammation of the breast.
Masturbation: Excitement of genital organs by the hand.
Maternis morbi; A place to receive pregnant women.
Mea'tus: A passage or canal.
Meatus urinarius: The external orifice of the urethra.
Meco'nium: That passed by infants after birth which accumulated in the intestines during pregnancy.
Mediasti'num: A membranous space formed by a double reflection of the pleura, extending from the spine to the posterior surface of the sternum.
Meninge'al: Relating to the covering of the brain.
Meningi'tis: Inflammation of the membrane of the brain.
Menopause; Stopped menses.
Menorrhagia: An excessive flow.
Menorrhea: A difficult or painful flow.
Mesenter'ica: Reflexion of the peritoneum.
Metabolism: The process by which cells assimilate the material carried to them.
Metastasis: A change in the seat of a disease.
Meteorism: Tympanitis.
Metritis: Acute inflammation in the womb.
Micrococcus: A producing disease; bacterium.
Micturition; The act of making water.
Migraine: Pain confined to one-half the head.
Mobile: Movable.
Morbific: Causing or introducing disease.
Myeli'tis: Inflammation of the spinal marrow or its membranes, indicated by deep-seated, burning pain in the spine.
Myocardi'tis: Inflammation of the muscles of the heart.
Nae'vus: Spots on children when first born.
Narcosis: Privation of consciousness; narcotic poisoning.
Narcotism; State of being under the influence of narcotics.
Nelaton's Line: This line is taken from the anterior-superior iliac spine to the most prominent part of the ischial tuberosity.
Neoplasm: A new formation of tissue, the product of morbid action.
Nephritis: A disease of the kidneys.
Neurosis; A generic name for diseases supposed to have their seat in the nervous system.
Neurasthenia: Nervous debility or exhaustion.
Neuropathic: Belonging to disease of nerves.

Neurotic: Disease of the nervous function.
Nodular; Relating to the teeth.
Nucha: The back or upper part of the neck.
Nymphoma'nia: Morbid or uncontrollable sexual desire.
Obturator: A name given in anatomy to several parts connected with the obturator foramen.
Occipital: Along the back part of the head.
Occlusion; A total or partial close of a passage.
Oedema: Swelling produced by an accumulation of a serous fluid in the areolar tissue.
Oidium albicans: A genus of fungi which form a floccose mass of filaments on decaying matter; aphthaphyte and parasite.
Olecranon: The head or protection of the elbow; a large process of the upper extremity of the ulna, on which we lean.
Oligomenor'rhea: Flowing too little.
Oophorectomy: Excision.
Orchitis; Hernia humoralis.
Os-interum: Opening of the womb.
Os: Mouth.
Ostium: The opening a door or gate, of the heart, for example.
Otitis-media: Inflammation of middle ear.
Ovarian: Relating to the ovaries.
Ovulation: Formation of ovules; discharge of ovum.
Oxalates; Salts of oxalic acid.
Oxyu'rides: Pin-worms.
Papula: A small acuminated elevation of the cuticle, with an inflamed base.
Parametric; Situated near the uterus.
Paraplegia: Palsy of lower half of the body on both sides.
Parenchy'matous: Relating to the parenchyma of an organ.
Parotitis: Inflammation of the parotid gland.
Parturition; Child-bearing; delivery.
Pathogenet'ic: Producing disease.
Pathological; Science which treats of disease.
Pathology: The branch of medicine whose object is the knowledge of disease.
Patulous: Spreading.
Pederast'y: The crime against nature: sodomy.
Ped'uncle: A flower stalk. This term has been applied to different prolongations, or appendices, of the encephalon; to the brain and cerebellum.
Ped'unculate: Having a pedicle; growing on a pedicle.
Pemphi'gus: A somewhat rare skin disease, characterized by the development of blebs upon different parts of the body.
Peptonize: To convert into peptone.
Percussion; Vibratory shock.
Perineum: The space at inferior region of trunk, between the ischiatic tuberosities, anus, and genital organs.
Peristal'sis: Vermicular movement.
Peritone'al: Relating to smooth membrane lining the abdomen.
Peritone'um: Lining membrane of inner wall of abdominal cavity.
Peritoni'tis: Inflammation of the peritoneum.
Perityphli'tis: Inflammation of cæcum, appendix, and connective tissue.
Pertussis: A violent convulsive cough; returns by fits; whooping-cough.
Pessary; A uterine support.
Phalanges: A name given to small bones of the fingers and toes.
Phimosis; Prepernatural narrowness of the opening of the prepuce.
Phlegmon; Inflammation of areolar tissue.
Phlegmonous: Relating to phlegmon, or inflammation of areolar tissue.
Phlogistic: Inflammatory.
Phthisical: Relating to progress of emaciation.
Phthisis; A wasting or consumption of the tissues.
Physiognomic; Pertaining to the face.
Placenta: The organ of attachment of a vertebrate embryo, or fœtus, to the wall of the uterus, or womb, of the female.
Plethora: Overfulness.
Polymorphous: Exhibiting many forms.
Polypus: A pear-shaped tumor.
Polyuria: Diabetes.
Popliteal: That which relates to the ham.
Portio dura: A small, white fasciculus.
Posterior: Moving; coming after.
Praecor'dia: Front part of the thoracic region.
Primipara; A female who brings forth her first-born.
Prodromic: Precursory.
Proglottis; One of the free, or nearly free, segments of a tapeworm.
Prolapsus; The falling down of a part through the orifice with which it is naturally connected.
Pronation: Rotation from without inwards.
Protean: Assuming different shapes and forms.
Pruri'tus: Heat; itching.

Psoas: Lumbar; the posæ muscles.
Psori'asis: A cutaneous affection, consiting of patches of rough, amorphous scales.
Pubes'cent: Relating to the pudenda, age, etc.
Pu'bic: A name given to the genital organs, as well as to other parts of the body.
Pyae'mia: A form of blood-poisoning and purulent contamination of the blood.
Pyeti'tis: Inflammation of the kidneys.
Pyrex'ia: The febrile condition.
Pyriform; Pear-shaped.
Quotidian; Daily.
Rachial'gia: Pain, colic.
Rachi'tis: Inflammation of the spine.
Radius: One of the bones of the forearm.
Rale; Noise produced by air in passing through mucus, of which the lungs are unable to free themselves.
Rancid: Having a rank taste or smell.
Recrudes'cence: The state of becoming raw or exacerbated again.
Reduce: To restore a displaced part to the proper relative situation.
Resonance: A return of sound.
Resolution: Removal or disappearance, as of a disease.
Revulsion: The act of turning the principle of a disease from the part in which it seems to have taken its seat.
Rhini'tis: Inflammation of the nose; coryza.
Rigidity: Great stiffness of fiber, or want of suppleness.
Rupture: To break or burst.
Ru'gae: Wrinkles.
Sacculate: Pouches, as in the colon.
Salicylate; A salt of salicylic acid.
Salicylic: Acid now made from phenol.
Salpingitis; Inflammation of the Fallopian tube.
Saprophit'ic: Feeding on decayed matter.
Sacro-coccygeal: Relating to the sacrum and coccyx.
Sacroiliac: Relating to the sacrum and ilium.
Sacrum: The bone which forms the posterior part of the pelvis, and is a continuation of the vertebral column.
Satyria'sis: An irresistible desire to have frequent connection with the female.
Scaphoid: A name given to several parts. This bone is situated at the forepart of the astragalus and inner part of the foot.
Scapula: The shoulder-blade.
Scarification; Slight scratching.
Sclerosis; Thickening with condensation.
Sclerosed: Hard, enduration.
Scrotum: The bag containing the testicles.
Scybala; Hard fœcal matter discharged in hard lumps.
Sebaceous; Pertaining to or secreting fat.
Seborrhea: A morbidly increased discharge of sebaceous matter upon the skin.
Secrete; To separate from the blood.
Sedatives: Medicines which directly depress the vital forces.
Semilunar: Having the shape of a half moon.
Senile: Relating to old age.
Septic; That which produces putrefaction.
Sepsis: Poisonous putrefaction.
Septicae'mia: A morbid condition of the blood produced by septic matters.
Septum; A partition.
Sequelae; A morbid phenomena left as the result of a disease.
Sessile: Not stalked or peduncled.
Sigmoid: Shaped like sigma or letter S.
Sinapisms: Mustard plasters.
Sin'ciput: The upper part or half of the head; the dome of the skull.
Slough; To separate dead matter from living tissue.
So'porous: Causing sleep.
Sor'des: Foul matter that collects on the teeth and tongue in low fever.
Spermatozo'id: Resembling a spermatozoa.
Sphinc'ter: An annular muscle that closes an opening.
Sporadic: Occurring singly, or apart from other things of the same kind.
Spore: A reproductive body in cryptogamous plants.
Sputum: That which is expectorated.
Stasis: Stagnation.
Stenosis: A narrowing of an opening.
Sternum: A flat, azygous, symmetrical bone, situated at the fore part of the chest.
Steth'oscope: An instrument for detecting disease by sound.
Stomati'tis: Inflammation of the follicles of the mouth.
Stroma: Substance of anargan, usually a tissue.
Struma: Scrofula.
Styloid: Shaped like a peg or pin.
Styptic: Stopping blood, astringent.
Sub-involution: Imperfect restoration of the uterus after delivery.
Sulce: A furrow; a groove.

Supinated: The movement in which the forearm and hand are carried outward, so that the anterior surface of the latter becomes superior.
Suppositories: Solid medicine introduced into the rectum.
Suppuration: Running matter.
Supine: Lying on the back.
Syco'sis: A pustular eruption upon the scalp or bearded part of the face; a fungous ulcer.
Symphy'sis: A union of bones.
Syncope: A fainting or swooning.
Synovia: A fluid resembling the white of an egg.
Synovitis: A term applied at times to inflammation of the synovial membrane.
Syphilis: An infectious disease communicated by coition.
Talipes varus: Lameness in the foot.
Tampon: A bung; a plug.
Tarsus: The posterior part of the foot.
Tendo Achillis: A fibrous cord, more or less round, long, or flattened.
Tendonous: Having the nature of tendons.
Tenesmus: Frequent vain desire to evacuate.
Tension: A stretching or straining, as when the tissues of a part are distended by the afflux of fluids.
Thallus: Matted together; interweaving.
Therapeutics: The discovery and application of remedies for disease.
Thrombi: Round, bluish tumors.
Thrombosis: Coagulation.
Thyroid: Shaped like an oblong shield; shape of a folding door.
Tibia: The largest bone of the leg, situated on the inner side of the fibula.
Toxaemic: Poisoning state of the blood.
Toxic: Poisonous.
Toxicolog'ical: The science which treats of diseases due to poisons.
Trachelorraphy: Plastic operation for restoring a fissured cervix uteri, or perineum.
Tracheot'omy: A surgical operation on the trachea.
Traumatism: The condition of organs affected by a grave wound.
Trochanter: Anatomists have given the names *great* and *little* trochanter to two processes at the upper extremity of the femur.
Turgescence: Superabundance of humor in a part.
Tympanitic: Distended with wind.
Ulna: Name of one of the bones of the forearm.
Umbilicus: The depression or mark in the median line of the abdomen which indicates the point where the umbilical cord is separated from the fœtus.
Unctious: Greasy; fatty.
Unilateral: Pertaining to one side.
U'rachus: It is regarded as a kind of suspensory ligament of the bladder.
Ure'ter: The canal that carries urine from the kidneys to the bladder.
Urethra: The excretory duct of the urine.
Urethritis: An inflammation of urethra.
Urticaria: Nettle-rash; hives.
Uterus: Womb for lodgment of the fœtus from conception till birth.
Vaginismus: A spasmodic action of the sphincter muscle at the opening of the vagina.
Vaginitis: Inflammation of the vagina.
Varicella: A specific contagious disease, usually of childhood; chicken-pox.
Variola: Smallpox.
Vascular: Relating to veins.
Vasomotor: That which causes movement in vessels.
Velpeau Bandage: Name of a bandage.
Venesection: Blood-letting.
Varicose: Irregularly-swollen or enlarged veins.
Vertigo: Dizziness or swimming of the head.
Vesication: The process of vesicating or raising blisters.
Vesico-vaginal: Relating to the bladder and vagina.
Vesiculose: Having bladdery vesicles.
Villous: Containing villi.
Violaceous: Resembling violets in color; bluish purple.
Vulva: A longitudinal opening between the projecting parts of the external organs of generation in the female.
Wheal: A ridge, or elevation of skin, produced by a rod or whip; such elevations as are seen in uticaria.
Zoster: Shingles.

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